Third
Five-Year Review Report
Solid State Circuits
Republic
Greene County, Missouri

September 2007

Region 7
United States Environmental Protection Agency
Kansas City, Kansas

and

Missouri Department of Natural Resources
Jefferson City, Missouri

Approved by: **Date:**

Cecilia Tapia

Cecilia Tapia, Director
Superfund Division

9/12/07

Table of Contents

1. Introduction 1
2. Site Chronology 2
3. Background 3
   A. Physical Characteristics 3
   B. Land and Resource Use 6
   C. History of Contamination 7
   D. Initial Response 7
   E. Basis for Taking Action 9
4. Remedial Actions 10
   A. Remedy Selection 10
   B. Remedy Implementation 11
   C. Operation and Maintenance 12
5. Progress Since the Last Five-Year Review 14
   A. Issues Potentially Affecting Current and/or Future Protectiveness 15
   B. Other Issues Identified During the Previous Five-Year Review 15
6. Five-Year Review Process 16
   A. Administrative Components 16
   B. Community Involvement 16
   C. Document Review 16
   D. Data Review 16
   E. Site Inspection 19
   F. Interviews 19
7. Technical Assessment 20
   Question A 20
   Question B 22
   Question C 24
8. Issues 25
9. Recommendations and Follow-Up Actions 26
10. Protectiveness Statements 27
11. Next Review 27

ATTACHMENTS

Attachment A: Figures
Attachment B: Additional Tables
Attachment C: Summary of TCE Result From Last Five Years and TCE Trend Plots
Attachment D: Site Inspection Photographs
Attachment E: Site Inspection Checklist and Roster
Attachment F: References and List of Documents Reviewed
Attachment G: Public Notice and Site Fact Sheet

List of Acronyms and Initialisms

Agencies	DNR & EPA combined
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CD/SOW	Consent Decree/Statement of Work
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	Contaminants or Chemicals of Concern
COPCs	Contaminants or Chemicals of Potential Concern
CW	Republic's municipal well
DBR	Deep Bedrock
DNR	Missouri Department of Natural Resources
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
FYR	Five-Year Review
GMMP	Groundwater Monitoring and Management Plan
MCLs	Maximum Contaminant Levels
µg/L	micrograms per liter (VOC concentrations in groundwater are provided in µg/L, $1x10^{-6}$ grams per liter)
MRAC	Missouri Remedial Action Corporation
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
PCE	Tetrachloroethylene
POTW	Publicly Owned Treatment Works
ppb	Parts per billion
RA	Remedial Action
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial Action Objective
RD/RA	Remedial Design/ Remedial Action
RI/FS	Remedial Investigation/ Feasibility Study
ROD	Record of Decision
SBR	Shallow Bedrock
SPHEM	Superfund Public Health Evaluation Manual
SSC	Solid State Circuits
TBC(s)	To Be Considered(s)
TCE	Trichloroethylene
UFSB	Unconsolidated/Fractured Shallow Bedrock
VOC(s)	Volatile Organic Compound(s)

Executive Summary

This Five-Year Review (FYR) at Solid State Circuits (SSC) in Republic, Missouri, is pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c); 40 Code of Federal Regulations (CFR) 300.400,(f)(4)(ii); Executive Order 12580; and Office of Solid Waste and Emergency Response (OSWER) Directives 9355.7-02 (U.S. Environmental Protection Agency [EPA] 1991), 9355.7-02A (U.S. EPA 1994), and 9355.7-03A (U.S. EPA 1995). The trigger for this third FYR is the signing date, September 20, 2002, of the second FYR. Issues identified during the previous FYR have been satisfactorily addressed.

The third FYR of the SSC site, located in Republic, Missouri, was completed in September 2007. The SSC site is well managed, and the system is operating as intended by the design and within the requirements specified in the Consent Decree/Statement of Work (CD/SOW). According to the Five-Year Performance Report prepared by the Missouri Remedial Action Corporation (MRAC) in 2006, long-term trending indicates the progress toward achievement of remediation goals is ahead of schedule.

Based upon the available data, the assessment of this FYR found the remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup standards. Currently, all threats at the SSC site have been addressed through hydraulic and institutional controls of the groundwater contamination.

While the remedy is operating as intended by the design and is meeting the performance requirements of the CD/SOW, two issues were identified in the FYR that require additional work. The two issues requiring further assessment and evaluation are summarized below.

Vapor Intrusion Exposure Pathway
There has been a recent refocus nationwide on the vapor intrusion to the indoor air pathway. This is especially true for sites with trichloroethylene contamination. This issue was considered during the remedial investigation but was not found to be a problem. However, for several reasons, MRAC is currently collecting soil vapor data.

Plume Delineation in the Shallow Bedrock and Unconsolidated/Fractured Shallow Bedrock
The nature of contaminant transport in the Unconsolidated/Fractured Shallow Bedrock (UFSB) and monitoring points in the Shallow Bedrock (SBR) and UFSB available for analysis limit the certainty of plume delineation. While the existing extraction well network was designed to capture contamination and maintain or reduce the plume limits, the data available to demonstrate this effect do not fully provide certainty in regard to protection associated with the existing institutional controls. An assessment of potential exposure points (i.e., private wells) outside the limits of the well restriction institutional control may provide sufficient data to demonstrate current protectiveness. It may also help in determining if any adjustments to the institutional controls are necessary to ensure future protectiveness.

The next FYR for the SSC site is required by September 2012, five years from the date of this review.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from CERCLIS): Solid State Circuits		
EPA ID *(from CERCLIS)*: MOD 980854111		
Region: 7	**State:** MO	**City/County:** Republic, Greene
SITE STATUS		
NPL status: Final		
Remediation status: Long-Term Operation and Maintenance		
Multiple OUs?* NO	**Construction completion date:** 09/20/1993	
Has site been put into reuse? Source – No, Plume area – Yes		
REVIEW STATUS		
Lead agency: State of Missouri		
Author name: Steve Auchterlonie (EPA) and Candice McGhee (MDNR)		
Author title: Remedial Project Manager	**Author affiliation:** EPA Region 7 and MDNR	
Review period: March 2006 through September 2007		
Date(s) of site inspection: June 4, 2007		
Type of review: Post-SARA		
Review number: 3		
Triggering action: Previous Five-Year Review Completion Date		
Triggering action date *(from WasteLAN)*: September 20, 2002		
Due date *(five years after triggering action date)*: September 20, 2007		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:
- Siltation of extraction well SSC-30
- Potential leak in water supply line in the vicinity of extraction well SSC-30
- Confirmation of appropriate coverage by the institutional controls designed to protect against exposure to contaminated groundwater; delineation of trichloroethylene at or below the Maximum Contaminant Level in the Unconsolidated/Fractured Shallow Bedrock and Shallow Bedrock
- Vapor Intrusion Pathway

Recommendations and Follow-up Actions:
- Determine the impact of siltation on remedy performance and effectiveness. Potential solutions include but are not limited to install a new well with deeper pump intake and install a new casing and screen inside the existing well.
- Assess the impact of the leaking/potentially leaking water line in the vicinity of extraction well SSC-30, provide an evaluation in terms of remedy performance and effectiveness, and provide recommendations for mitigating or eliminating ancillary issues stemming from the water line leak.
- Determine the most effective means for confirming appropriateness of the institutional control coverage area; possible paths include but are not limited to new monitoring wells to enhance plume delineation, downgradient private well survey, and general increase in institutional control coverage area.
- Continue evaluation of the vapor intrusion exposure pathway; possible paths include but are not limited to soil gas samples, indoor air monitoring, plume delineation, and modeling.

Protectiveness Statement(s):
Based upon available data, the assessment of this FYR found the remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup standards. Currently, all threats at the SSC site have been addressed through hydraulic and institutional controls of the groundwater contamination. While the remedy is operating as intended, two issues require further assessment: vapor intrusion and plume delineation.

Solid State Circuits
Republic, Missouri
Third Five-Year Review Report

1. INTRODUCTION

The purpose of a five-year review (FYR) is to determine whether the remedy at a site is protective of human health and the environment. The FYR report documents the methods, findings, and conclusions of a review including any identified issues and recommendations to address them.

The U.S. Army Corps of Engineers (USACE) has prepared this FYR report on behalf of the Missouri Department of Natural Resources (DNR), the lead agency for this National Priorities List (NPL) site, and on behalf of the U.S. Environmental Protection Agency (EPA), pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The NCP, 40 CFR §300.430(f)(4)(ii), states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

This FYR for the Solid State Circuits (SSC) site in Republic, Greene County, Missouri, was conducted from September 2006 through September 2007. The review was initiated by DNR, and USACE was added to the team in May 2007 as the primary author. This is the third FYR for the SSC site. The first FYR was approved in December 12, 1996. The second FYR was approved September 20, 2002. The approval date of the second FYR is the trigger date for this FYR. The FYRs continue because hazardous substances, pollutants, or contaminants remain at the SSC site above levels that allow for unlimited use and unrestricted exposure.

This third FYR report summarizes:

- Site background information
- Remedial Action (RA) activities
- Performance and operational monitoring results
- Site inspections
- Data review

- Remediation progress and status at the site

The information summarized in this report was obtained from the SSC site Remedial Investigation (RI) Report, Record of Decision (ROD), the Consent Decree/Statement of Work (CD/SOW), sections of the 100 Percent Remedial Design Document Package (RDDP), the First FYR Report (December 1996), the Second FYR Report (September 2002), quarterly hydraulic performance reports, annual chemical monitoring reports for the years 2001 through 2006, and other relevant documents. Attachment F lists all the documents reviewed for this FYR.

2. SITE CHRONOLOGY

Table 1: Site Chronology

Event	Date
SSC Site Manufactured Printed Circuit Boards	1968 to 11/1973
TCE Discovered in CW-1 During NSOC Survey	06/1982
Agencies Conducted Response Activities	04/1983 to 03/1984
SSC Site Placed on the Missouri Registry of Sites	02/22/1985
DNR and Responsible Parties Conducted Removal Activities	03/1985 to 11/1985
EPA Signed Action Memorandum	04/05/1985
EPA Conducted Removal Activities	04/05/1985 to 10/31/1985
Final Listing on EPA NPL	06/10/1986
Cost Recovery Settlement Agreement & Consent Decree Entered by Federal Court	11/20/1986
SSC Site Conducted RI/FS	12/1986 to 07/1989
ROD Selecting the Remedy is Signed	09/27/1989
Consent Decree/Statement of Work (CD/SOW) Entered by Court	05/1991
RD Pilot Remediation Program	09/01/1991 to 01/31/1992
MRAC's RD Approved by DNR with EPA Concurrence	12/22/1992
Implementation of RA Construction	01/11/1993
RA Construction Completion Date	09/20/1993
Preliminary Close Out Report Received by DNR	12/01/1993
RA Certification Report Received by DNR	05/1994
RA Operation & Maintenance (O&M) Plan Approved	05/1994
ESD Issued by DNR with EPA Concurrence, Regarding Modification of UFSB and DBR Chemical Quality and Hydraulic Performance Monitoring	10/24/1996
First Five-Year Review Approved	12/12/1996
Horizontal Well Pilot Test	2001-2002
Second Five-Year Review Approved	09/20/2002
ESD to Allow Full Operation of Horizontal Well	09/2004
Public Notice for Start of Five-Year Review Process	03/28/07
Site Inspection for Five-Year Review	06/04/07

3. Background

This section presents SSC site background information including the physical characteristics of the SSC site, land and resource use, history of contamination, initial responses to the contamination at the SSC site, and the basis for the RAs taken at the SSC site.

A. Physical Characteristics

Site Location

SSC is located in T28, R23W Section 20, at 37° 07' 05" N, 93° 28' 48" W. The SSC site is located on the southeast corner of the intersection of Main Street and Elm Street in downtown Republic, Missouri, as shown on Figure 1. Republic is approximately 12 miles southwest of Springfield in Greene County, Missouri, and has a population of approximately 13,000 residents.

The SSC site includes the northern end of the former plant building, the soils below and around the former building, and impacted on-site and off-site portions of the underlying groundwater aquifers. The site of the former plant building is less than one acre in size and is secured with a six-foot high chain-link fence. The original building and basement extended the entire length of Main Street between Mill and Elm Streets. The northern portion of the building was four stories tall while the remaining portion was one story. The SSC site and former plant building have a relatively unclear history and very little is known about chemicals used on-site, although it had been leased or owned by numerous businesses through the years. The plant building was constructed prior to 1902 and was originally operated by a milling company. Circa 1902 to 1937, a cold refrigeration plant operated in the northern portion of the building.

SSC operated in the northern portion of the building from 1968 until November 1973. During that time, SSC manufactured printed circuit boards and used trichloroethylene (TCE) in the cleaning process.

Micrographics, Incorporated, a photographic-processing firm, operated from 1973 until 1979 at the SSC site. In November 1979, the northern end of the building was destroyed by fire, the damaged portion was demolished, and the debris was pushed into the basement. The basement area was then filled to grade for use as a gravel parking lot. The remaining portion of the building was repaired and refurbished.

Crane Manufacturing Company of Crane, Missouri, purchased the property and then sold it to Mr. Nicholas Weinsaft who owned it from 1976 until 1998. In 1998, Mr. Lance McKnelley and Mr. Don Rogers purchased the property. Mr. McKnelley sold his portion to Mr. Rogers in 1999. Landon Enterprises, Inc., is the current owner.

Geological and Hydrogeological Characteristics

The SSC site is located within the Springfield Plateau section of the Ozark Plateau physiographic province of the Interior Highlands major division. The city of Republic is located on a northeast-southwest trending topographic high that serves as a drainage divide. Elevation at the SSC site is approximately 1,300 feet above mean sea level. Northern surface drainage flows toward Dry Branch and Pickerel Creek which then flows into the Sac River. The Sac River lies within the Osage River drainage basin. Southern surface drainage flows toward Shuyler Creek which then flows into Wilson Creek. Wilson Creek flows into the James River. These drainages lie within the White River drainage basin.

Surface soils in the vicinity of the SSC site are classified as Creldon silt loam and are considered to be deep and moderately well drained. These soils are generally formed on the tops and sides of ridges and upland areas. Soils beneath the SSC site consist of a sandy brown clay containing fragments of weathered limestone and are considered to be representative of fill material rather than naturally occurring soil. Off-site soils are commonly a medium to dark brown silty clay loam that contain some sand and weathered limestone fragments. Subsurface soils are generally 15 to 25 feet thick and consist of residuum weathered from the underlying bedrock. These soils typically grade from a medium brown silty clay to a brownish orange-red silty to sandy dense clay containing chert and weathered limestone fragments. Increasing sand and gravel are encountered near the bedrock contact.

Bedrock beneath the SSC site consists of in descending order – Mississippian, Ordovician, Cambrian, and Pre-Cambrian units. The Mississippian-age Burlington-Keokuk Limestone is the uppermost bedrock formation in the vicinity of the SSC site and can range from 80 feet up to 230 feet thick in the Ozark Plateau region. The formation is a coarse crystalline limestone that commonly contains discontinuous beds of chert. The upper portion has been intensely weathered resulting in the overlying residuum. Beneath the Burlington-Keokuk Limestone are the Mississippian Elsey, Reeds Spring, and Pierson Formations. The Elsey and Reed Springs Formations are described as fine-grained to argillaceous cherty limestone while the Pierson Formation is described as a dolomitic limestone. Below these formations lies the Mississippian Northview Formation, a shale-to-shaley limestone unit which ranges in thickness from 5 to 30 feet across the region. Below the Northview lies the Mississippian Compton Limestone, a dense limestone unit which is underlain by a very thick sequence of Ordovician and Cambrian units which are composed of limestone, dolomite, and sandstone with some discontinuous beds of siltstone and shale. The Pre-Cambrian bedrock consists of metasedimentary and igneous rocks which comprise the basement complex. A cross-section of the subsurface geology is shown on Figure 2.

Periodic uplifting of the Ozarks Plateau region has resulted in extensive faulting, fracturing, and the development of joints in the bedrock. Locally, numerous structural features including lineations have been identified in the Republic, Missouri, area. Work performed during the RI identified a fracture zone in the upper portion of the shallow bedrock that traces from the SSC site along Main Street southward. South of city well CW-1, the fracture zone traces toward the southeast near extraction well SSC-31.

Groundwater flow in clastic sedimentary and crystalline (limestone/dolomite) rocks varies depending upon the porosity, permeability, and structural features of the rocks. Hydrologic characteristics of these rocks may be impacted by cementation and compaction of the pore spaces as well as sedimentary structures including bedding planes. Limestone and dolomite typically have both low porosity and primary permeability due to the crystalline nature of the rock. Secondary permeability can be attributed to fracturing and the development of joints in the rock, and it is dependant upon the number and size of the fractures. Groundwater flow channels are enlarged via the dissolution of limestone or dolomite as unsaturated water with respect to calcite and dolomite flows through fractures, joints, and bedding planes. Dissolution of the limestone and dolomite can result in the development of karst topography. Karst features include springs, losing streams, sinkholes, and caves. Southwest Missouri is characterized by karst topography which often affects the surface water hydrology such as Shuyler Creek which is classified by DNR as a losing stream. Stream flow in Shuyler Creek is lost to the shallow bedrock aquifer and is thought to feed Roberts Spring (Figure 1).

The groundwater system within the Ozark Plateau region is characterized by seven major hydrogeologic units which have been subdivided into three major aquifers and four confining units. These units are based on geologic and hydraulic properties including permeability and well yields. The SSC site is located within the Springfield Plateau aquifer unit which is a sub-hydrogeologic unit of the Ozark Plateaus Aquifer System. The aquifer units which are of importance in the Republic, Missouri, area include in descending order – the Springfield Plateau aquifer, the Ozark confining unit, and the Ozark aquifer. Bedrock units beneath the SSC site that correlate to these aquifer units include: (1) the shallow bedrock unit – Springfield Plateau aquifer, (2) the Northview Formation/Compton Limestone – the Ozark confining unit, and (3) the deep bedrock unit – the Ozark aquifer. The Springfield aquifer is an unconfined aquifer in the Republic, Missouri, area.

Site-specific hydrogeologic units have been identified in the vicinity of the SSC site. The upper-most aquifer unit at SSC is designated as the Unconsolidated/Fractured Shallow Bedrock (UFSB) unit which includes the saturated portion of the unconsolidated residuum and the fractured/weathered portion of the upper shallow bedrock unit. The UFSB extends to approximately 70 feet below ground surface (bgs). Below the UFSB unit is the unfractured Shallow Bedrock (SBR) unit which extends approximately 230 feet to the top of the Northview Formation. The Northview Formation/Compton Limestone confining unit ranges in thickness between 15 to 30 feet. Below the Northview Formation/Compton Limestone is the Deep Bedrock (DBR) unit which extends to approximately 1,300 feet bgs.

In the SBR and DBR units groundwater is thought to flow in zones of higher porosity and along bedding planes. Dissolution of the limestone and dolomite bedrock results in increased groundwater storage and flow. The deeper portion of the SBR is thought to be less permeable than the UFSB, although a zone of higher porosity was detected between 177 feet and 209 feet bgs during borehole geophysical studies conducted during the RI. The UFSB to about 70 feet bgs is not considered a significant water producer. The lower portion of the SBR to about 300 feet bgs can locally produce about 100 gallons per minute (gpm).

Regional groundwater flow in the Springfield and Ozark aquifers is toward the south-southeast which was confirmed by pre-remedial groundwater level measurements and potentiometric surface maps constructed during the RI. However, due to the large groundwater withdrawal rate by the Springfield municipal well field, groundwater flow in the DBR is generally to the northeast (toward Springfield). Republic's municipal wells located to the west and northeast of the SSC site are also installed into the deep Ozark aquifer. These wells also influence the direction of groundwater flow within the DBR on a local scale when pumping. The effect of the pumping wells on the SBR is limited due to the Ozark confining unit, although on a small scale there may be some influence due to well-specific construction and the potential for downward leakage within the annular space.

On a local scale, groundwater flow in the UFSB and SBR is toward the Shyuler Creek drainage basin and Roberts Spring. On a site-level scale, groundwater flow in the UFSB is generally toward the Main Street fracture zone which is thought to act as a hydraulic sink. Studies performed during the RI indicate there is hydraulic communication between the UFSB and the SBR. Groundwater level measurements indicate there is a downward hydraulic gradient between these aquifer units. A vertical hydraulic gradient exists across the Northview/Compton Limestone which is considered to act collectively as a leaky-confining unit to the underlying Ozark aquifer. Due to considerable pumping of the DBR aquifer for municipal and industrial use, an increase in leakage across these units into the DBR may occur.

B. Land and Resource Use

The area surrounding the SSC site is predominantly urban. Currently, residential areas exist to the east, west, and two blocks to the south. Most of the dwellings are single family homes although a small apartment complex is located across Main Street from the complex of wells near old city well CW-1. Commercial properties including light industry and warehouses are intermingled with the single family dwellings to the west. Light industry and city property are located to the north and south of the SSC site. A daycare facility is located to the north of the SSC site across Elm Street.

Inset Showing the Solid State Circuits Site

The city of Republic provides potable drinking water from water supply wells located in various locations around the city. Currently, municipal wells CW-3, CW-4, and CW-5 are operational and supply Republic's water needs. TCE contamination has only been detected in Republic's CW-1 which was taken out of service in July 1983. Republic's CW-2 was taken out of service in the fall of 1997 for nonTCE-related issues. The only groundwater aquifer unit that supplies water to the three functioning Republic municipal wells is the DBR.

C. History of Contamination

SSC manufactured printed circuit boards at the site from 1968 through 1973 in the building's north end. Volatile organic compounds (VOCs) and metals were used in the manufacturing and plating process. Solvents such as TCE were used in the cleaning process. Due to a lack of viable records, a reliable estimate of the volume of hazardous substances used is not available.

TCE was reportedly stored in the north-end basement sump pit, near the basement well. Early sampling data indicated the improper management of spent TCE and copper-plating solutions caused the on-site and off-site contamination of surface and subsurface soils, air, utility conduits, and groundwater. The elevated VOC concentrations in the on-site subsurface soils and groundwater beneath the SSC site indicated an on-site release had occurred. The off-site groundwater contamination had also affected Republic's municipal water supply well CW-1.

D. Initial Response

Regulatory Agency Involvement

DNR collected water samples from Republic's three municipal wells and the distribution system in June 1982 as part of the *EPA National Synthetic Organic Chemical Survey*. TCE contamination was detected in municipal well CW-1 which triggered further investigations. Between April 1983 and March 1984, EPA and DNR initiated response actions to identify contaminant sources and to further investigate the TCE occurrence in the CW-1 well. The former SSC manufacturing and plating plant was identified as the source of the TCE contamination.

On August 26, 1983, DNR notified the property owner the SSC site was proposed for inclusion on the Missouri *Registry of Confirmed Abandoned and Uncontrolled Hazardous Waste Disposal Sites*. The listing was appealed and an agreement was reached at which time the SSC site was placed on the *Registry* on February 22, 1985.

The SSC site was proposed for listing on the NPL on October 15, 1984. On October 1, 1985, a Multi-Site Cooperative Agreement was signed by EPA and DNR; and on October 7, DNR assumed the long-term responsibility of the SSC site. The SSC site was listed on the NPL on June 10, 1986.

Removal History

DNR, with some participation from the responsible party, conducted removal response activities at the SSC site in four phases (March through November 1984). Extensive soil and groundwater sampling was done to delineate the on-site and off-site contamination. Contaminated on-site soils and debris were excavated from and around the basement of the former plant. Due to the Resource Conservation and Recovery Act disposal requirements, a portion of the excavated materials was stored on-site until a proper disposal facility was located. The remaining materials were shipped to an off-site disposal facility. Three monitoring wells were installed, and a wooden fence was installed for site security.

On April 5, 1985, EPA signed an Action Memorandum to undertake an immediate removal action. This removal action was conducted during April 1985 through November 1985. To determine the necessary extent of the removal, additional soil and groundwater sampling was performed. Sample results indicated sub-basement soils and debris were highly contaminated. All material was excavated to bedrock and shipped off-site for disposal along with the previously stockpiled contaminated materials. The basement well was abandoned per Missouri state regulations, and the excavation was filled to grade with clean materials. Four additional off-site monitoring wells and two on-site recovery/monitoring wells were installed. A chain-link fence with barbed wire and a locking gate were installed for added site security. Final grading and seeding were completed on October 31, 1985.

Remedial History

In December 1985, the responsible party submitted a plan to DNR to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the SSC site. The RI/FS was conducted from December 1985 until July 1989. During this time, multi-media monitoring and sampling events were conducted and included on-site and off-site air, surface, and sub-surface soils, utility corridors, surface water, and groundwater. Additional work included the installation of monitoring wells and the construction of a new municipal water supply well CW-4. A pilot program was implemented to evaluate the extraction and treatment of the contaminated groundwater.

The RI identified TCE and other VOC contamination in the three hydrogeologic units both on-site and off-site. The completed RI/FS and the Proposed Plan were released to the public on August 14, 1989. Since the previous response actions had addressed the contaminated on-site soils and debris, the ROD only addressed the contaminated groundwater. The selected remedy included extraction and treatment of the groundwater and discharge to the city of Republic's Publicly Owned Treatment Work (POTW) facility. The ROD was approved and signed on September 27, 1989.

Between December 1989 and July 1990, the Agencies (DNR and EPA) and the responsible party negotiated the terms for the CD/SOW for the Remedial Design/Remedial Action (RD/RA) in accordance with the ROD. Near the end of negotiations, the responsible party

sold the SSC site's assets and the money was placed in trust to finance the remedial work. The effective date for the CD/SOW was in May 1991. The Trust Agreement was approved in October 1991.

E. Basis for Taking Action

Data collected during the various investigations and removal activities at the SSC site identified over 33 contaminants of potential concern (COPCs) on-site and/or off-site. Contamination, predominantly TCE, was detected in various media including on-site and off-site soils, groundwater in the three hydrogeologic units, utility corridors and manholes, and the influent to the POTW. The following is a list of detected COPCs and their locations:

On-site Groundwater: Cadmium; chromium; iron; mercury; nickel; zinc; benzene; carbon tetrachloride; chlorobenzene; chloroethane; chloroform; 1,1-dichloroethane; 1,1-dichloroethene; 1,3-dichloropropylene; ethylbenzene; methylene chloride; tetrachloroethylene (PCE); toluene; trans-1,2-dichloroethene; 1,1,1-trichloroethane; 1,1,2-trichloroethene; TCE; vinyl chloride; acetone; and 1,2-dichloroethylene.

Off-site Groundwater: Lead; magnesium; manganese; 1,2-dichloroethane; 1,2-dichloropropane; methyl chloride; 2-butanone (MEK); TCE; and carbon disulfide.

Republic's Drinking Water: Copper and TCE.

On-site Soil: Benzene; 1,1-dichloroethane; 1,1-dichloroethene; methylene chloride; PCE; trans-1,2-dichloroethene; 1,1,1-trichlorothane; 1,1,2-trichloroethene; TCE; and vinyl chloride.

Off-site Soil: Chloroform, ethylbenzene, toluene, and TCE.

Sewer: Chloroform; 1,1-dichloroethane; ethylbenzene; toluene; trans-1,2-dichloroethene; 1,1,1-trichloroethane; and TCE.

SW Bell Telephone: 1,1-dichloroethane; 1,3-dichloropropylene; methylene chloride; and TCE.

Due to the large number of COPCs and the wide variations in occurrence, concentrations, and toxicities found between the COPCs, a selection process was implemented to identify contaminants of concern (COCs) for evaluation in the risk assessments. The COCs chosen focused on contaminants that would probably cause risk to human health and the environment. Metals were not considered COCs because the concentrations were found at levels below health standards. The COCs included: 1,1-dichloroethane; 1,1-dichloroethene; trans-1,2-dichloroethene; methylene chloride; 1,1,1-trichloroethane; TCE; and vinyl chloride. These COCs were used in the Human Health and Ecological Risk Assessments.

At the time of the risk assessments, federal and state standards and criteria existed to protect drinking water and fresh-water aquatic life. The federal standards (Maximum Contaminant Levels [MCLs]) and/or Missouri Water Quality Standards existed for the 1,2-dichloroethene, methylene chloride, 1,1,1-trichloroethane, TCE, and vinyl chloride. Safe Water Drinking Act MCL Goals existed for trans-1,2-dichloroethene. No regulatory standards existed for 1,1-dichloroethane.

Based on the Human Health Risk Assessment, "no unacceptable" health risks were identified, but there was the potential for future unacceptable risks. Future risks were based on dermal contact or ingestion of the contaminated groundwater. To prevent future risk, a city ordinance was established stating no private or public wells would be installed in or near the contaminant plumes, and the remediation of the contaminated groundwater would continue as required.

Based on the results of the Ecological Risk Assessment, no adverse effects were identified for terrestrial or aquatic ecosystems. There was no indication of threatened or endangered wildlife species; however, it was determined should Roberts Spring become contaminated by site-related groundwater in the future, it would pose a new risk.

4. Remedial Actions

A. Remedy Selection

As previously indicated, the ROD for the SSC site was signed on September 27, 1989. The Remedial Action Objectives (RAOs) were developed to aid in the screening of remedial alternatives proposed in the 1989 FS. The RAOs were divided into source control and management of migration response objectives and included the following:

Source Control Response Objectives

- Prevent potential exposure to contaminated groundwater by containment and remediation.
- Protect uncontaminated groundwater for future use by preventing further migration of contaminated groundwater plumes.
- Restore contaminated groundwater for potential, future residential use by reducing the TCE concentration to less than 5 parts per billion (ppb) – the MCL for TCE in groundwater.
- Protect the city of Republic's water supply for current and future use by preventing the spread of the contamination.

Management of Migration Response Objectives

- Eliminate or minimize the threat posed to human health and the environment by preventing exposure to groundwater contaminants.
- Prevent further migration of groundwater contamination beyond its current extent.

- Restore contaminated groundwater to federal and state applicable or relevant and appropriate requirements (ARARs), including drinking water standards, and to a level that is protective of human health and the environment within a reasonable period of time

As the previous response actions had addressed contaminated soil, the remedial alternatives evaluated in the FS addressed only the three contaminated hydrogeologic units. The following describes the components of the remedy selected in the ROD:

1. Extraction of the contaminated groundwater from the three hydrogeologic units by existing and new extraction wells.
2. On-site treatment of the extracted groundwater using the two existing air strippers.
3. Discharge of treated water to the city of Republic sewer system to receive further treatment at the POTW.
4. Issuance of a city ordinance to prohibit construction of public and private water supply wells in areas and hydrogeologic units of known groundwater contamination.
5. Continued groundwater monitoring to determine the effectiveness of the remedy.

The following describes the management components of the remedy selected in the ROD:

1. The use of the pump and treat system to achieve groundwater cleanup levels.
2. A review of planned drinking wells to prevent their construction within or near the contaminated groundwater plumes as defined in the city ordinance.
3. Chemical quality and hydraulic performance monitoring data collection.
4. Periodic agency site inspections.
5. Conduct FYRs to assess site conditions, contaminant distribution, and any associated site hazards.

B. Remedy Implementation

Prior to issuance of the ROD, an earlier pilot treatment system had been installed at the SSC site to address the on-site groundwater contamination. As part of the RD/RA process, a second pilot study was initiated to test various extraction well pumping schemes in order to better define the pumping and discharge rates. The results of the pilot study were incorporated into the RDDP which was submitted to the Agencies. The responsible party submitted the designs and specifications for the upgraded mechanical air stripping system and proposed increase in the stack heights of the two existing air strippers, sewer level sensor system, the design specifications for the proposed Data Management System, and the results of the Air Modeling Study. In October 1992, the Agencies received the 100 Percent RDDP and determined the proposed system for removing TCE from the contaminated water was 98 to 99 percent efficient. On December 22, 1992, DNR approved and EPA concurred with the 100 Percent RDDP for the groundwater cleanup alternative.

RA construction began on January 11, 1993. Construction activities included the installation, testing, and sampling of extraction and monitoring wells and the treatment system. Republic's CW-2 well was taken offline due to non-site-related activities, and the new municipal well, CW-5, was constructed and brought online. RA construction activities were

completed on September 20, 1993. On October 29, 1993, DNR sent EPA the Preliminary Close Out Report for the long-term RA at the SSC site. EPA approved and signed the document and it was returned to DNR on December 1, 1993. In March 1994, DNR conducted a pre-certification inspection of the RA at the SSC site per the CD/SOW. The inspection determined the RA construction was complete and the remedy was operational and functional. Hydraulic control of the three hydrogeologic units had been achieved and maintained. EPA concurred on May 19, 1994.

On May 31, 1994, DNR received the RA certification report and As-Built Drawings for the SSC site. The Agencies sent the responsible party the DNR "Certification of Completion of the Remedial Action" for the SSC site in September 1994. The document notified the responsible party the remedy for the SSC site was operational and functional, and it initiated the SSC site's long-term RA A schematic diagram of the treatment system is provided in Figure 3.

Elements of the RA include:

- The extraction of contaminated groundwater from the three hydrogeologic units–the UFSB, the SBR, and the DBR.
- The treatment of the extracted contaminated groundwater using the on-site air strippers.
- The discharge of treated groundwater to the Republic sewer system for additional treatment at the POTW.
- The issuance of a city ordinance restricting the construction of water supply wells into areas of known groundwater contamination.
- Continued monitoring and reporting of the treatment system, contaminant plumes, and contaminated groundwater via the chemical quality and the hydraulic performance monitoring reports.

Part of the long-term RA includes continuation of the long-term, site-specific remedial activities including operation of the pump and treat system, the ongoing monitoring and reporting of these activities, and periodic review of Republic's well construction ordinance which was originally implemented in 1993. After groundwater cleanup levels have been met, the Agencies will issue a Final Close Out Report. With responsible management of the trust and regular Agency review, it is projected enough funds will exist to cover future costs.

C. Operation and Maintenance

MRAC is conducting, with the Agencies' oversight, long-term RA operation and maintenance (O&M) of the SSC site according to the O&M plan that was jointly approved by the Agencies on June 16, 1994. The O&M plan set forth system procedures and equipment maintenance procedures to be implemented for effective day-to-day and long-term operation of the selected remedy for the SSC site. The primary activities associated with O&M include the following:

- Remedial system descriptions
- Normal operating, inspection, and maintenance procedures and schedules

- Potential operating problems and operation troubleshooting
- Equipment monitoring and inspection requirements
- Monitoring requirements to ensure appropriate O&M of the recovery and treatment systems
- Contingent corrective action provisions
- Recordkeeping and reporting requirements to include personnel and safety

On September 23, 1994, DNR received the final copy of the "Addendum Report to the RA Groundwater Monitoring and Management Plan (GMMP)." The GMMP contains the specific tasks required to evaluate the monitoring activities and site management as part of the groundwater RAs and their progress. This includes the requirements of the hydraulic control measures for the three hydrogeologic units, management of the extraction and monitoring wells, data collection and analysis, management practices, data reporting, and quality assurance/quality control requirements.

The requirements for the SSC site groundwater remedy are in accordance with the RD/RA CD/SOW that was entered into court on May 31, 1991. The CD/SOW defines the schedule for the submittal of the progress reports which are submitted by MRAC for the Agencies' approval. This schedule was initiated following the approval of the 100 Percent RDDP. The reports document the chemical quality and hydraulic performance monitoring. These reports and additional DNR split sampling are the basis of the long-term RA O&M of the SSC site.

The O&M costs for the first five years were associated with the chemical quality and hydraulic performance monitoring of the chosen groundwater remedy for the SSC site. In addition to the CD/SOW requirements, the second five years of O&M costs included the initiation of the 2004 Explanation of Significant Difference (ESD) which included post-closure groundwater monitoring of CW-1 and the evaluation and implementation of the horizontal well—an innovative technology. In order to implement these actions, additional chemical quality monitoring information and data and hydraulic performance parameters were needed. The end result was an increase in the overall O&M cost for the second five years. The third five years include the CD/SOW requirements, costs for development of additional technologies that may be applicable to the SSC site, and an increase in RA maintenance costs associated with periodic maintenance (Table 2).

Table 2: Annual System Operations/O&M Costs

Time Period (organized by half-year)	Cost (rounded to nearest $1K)
Spring 2002	$263,000
Fall 2002	$206,000
Spring 2003	$219,000
Fall 2003	$199,000
Spring 2004	$202,000
Fall 2004	$216,000
Spring 2005	$267,000
Fall 2005	$181,000
Spring 2006	$307,000
Fall 2006*	$418,000

*Preliminary Data

5. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The protectiveness statement provided in the last FYR:

> *The remedy at the SSC site is, and should remain, protective of human health and the environment. The remedy, a pump and treat system, will continue to operate for another twenty years or upon attainment of the groundwater cleanup goals. The immediate threats were addressed, thus exposure pathways that could result in unacceptable risks are being controlled by the remediation of the contaminated groundwater. All threats at the site have been addressed through on-site soil removal, the pump and treat system, the installation of fencing and warning signs, and the implementation of institutional controls.*
>
> *The long-term protectiveness of the remedy has been and will be verified by continued annual groundwater quality chemical monitoring and quarterly hydraulic performance monitoring of the three aquifers. The monitoring program follows specific criteria set forth in the CD/SOW.*

Four issues were identified in the previous FYR. Two of the issues were determined to potentially affect current and/or future protectiveness of the remedy. The other two issues did not have a current or future impact on the protectiveness of the remedy. These issues, the recommendations, and a summary of the completed follow-up actions are summarized below (refer to the previous FYR for more information).

A. Issues Potentially Affecting Current and/or Future Protectiveness

Pump and Treat System

Progress on this issue is satisfactory. The effectiveness of the pump and treat system is continually evaluated, and steps are taken when necessary to ensure the system will continue to operate properly and successfully. Chemical and hydraulic data are routinely collected. The data are evaluated as part of the ongoing system evaluation. Other significant activity includes:

- Continued removal of TCE from the groundwater with a general downward trend in TCE concentrations in most of the extraction and monitoring wells. The total estimated TCE removed over the last five years has been 8.8 gallons, for a total of 64.2 gallons since the beginning of the RA.
- A packer test was performed on CW-1, and it found contaminated groundwater from the shallow aquifer is entering the well from the base of the casing. The packer has remained in place to prevent further TCE from entering the DBR from the shallow aquifer.
- The remedy has consistently met hydraulic performance criteria as outlined in the CD/SOW.
- The system has been well maintained with components replaced or repaired as needed.
- Quarterly and annual reports are submitted on time and provide a comprehensive summary of the data collected and the activities that have taken place over the reporting period.

Horizontal Well in the Unconsolidated/Fractured Shallow Bedrock

Progress on this issue is satisfactory. In addition to the short-term tests that were completed, a one-year pilot test was executed. The one-year pilot project was executed from December 2001 through December 2002. Based on the results of the pilot project and the subsequent approval of an ESD to the ROD in 2004, the horizontal well was approved for continued use. On June 30, 2003, MRAC received approval from DNR to begin full-time use of the horizontal well as part of the remedy. Since that time, MRAC has discharged approximately four million gallons of treated groundwater to the horizontal well reducing sanitary sewer discharge costs by nearly $23,000.

B. Other Issues Identified During the Previous Five-Year Review

Incorrect Area Code on Site Signs – This error has been corrected. Progress on this issue is satisfactory.

Site Legal Description as Found in the Missouri Registry – This issue has been addressed. Progress on this issue is satisfactory.

6. FIVE-YEAR REVIEW PROCESS

A. Administrative Components

This FYR was completed through combined efforts of the Agencies, USACE, city of Republic, and the operating contractor. USACE was designated as the primary author of the FYR with approval and comment by the Agencies.

The review schedule included the following components:

- Community Involvement (none solicited, see section B)
- Document Review
- Data Review
- Site Inspection
- Local Interviews (operating contractor)
- FYR Report Development and Review

The review schedule will provide for approval of the third FYR by the scheduled suspense date of September 2007.

C. Community Involvement

A public notice was printed in the *Republic Monitor* newspaper for community notification on March 28, 2007. In addition, a fact sheet was developed for the SSC site. Both are included in Attachment G.

Upon finalization of this FYR, a notice announcing completion of the FYR will be placed in the *Republic Monitor* newspaper. The notice will provide information similar to the initial notice and will add information on the location of the FYR for public viewing (i.e., the Information Repository).

D. Document Review

Historical documents (including the RI, Baseline Risk Assessment [BLRA], ROD, ESD, and the CD/SOW) were reviewed as part of the FYR. These documents provided information necessary to the development of an understanding of the SSC site and application of the FYR process. Annual reports associated with the period of review were also reviewed. A listing of relevant documents used during this FYR is provided in Attachment F.

E. Data Review

As required by the CD/SOW, the SSC site is required to submit quarterly hydraulic performance reports and annual reports summarizing chemical and hydraulic monitoring data collected during the year. The annual reports were reviewed to determine compliance with performance requirements identified in the CD/SOW, assess progress in attaining the

remedial goals, and to determine if there were any issues that would call into question the protectiveness of the remedy.

Below is a summary of findings from the review:

- Hydraulic performance criteria defined in the CD/SOW have been satisfied for all three hydrogeologic systems.
- Downtime performance criteria have been satisfied for all three hydrogeologic systems.
- The TCE concentration has been below 200 micrograms per liter (µg/L) for all sewer discharges (per city and ROD requirements).
- Discharge rate to the sewer has been maintained below 200 gpm (per requirements).
- TCE concentrations of the effluent from the treatment system have been consistently below reporting limits which have ranged from 1 to 5 µg/L (per requirements).
- Since the beginning of the RA, an estimated 64 gallons of TCE have been recovered.
- Extraction well SSC-30 pumping rates required to meet the hydraulic performance criteria have increased over time. The reason for this is being investigated. One possible cause being investigated is a leaking water supply line in the area. MRAC has reported this possibility to the city of Republic, but no action on the city's part has occurred to date.

Attachment C summarizes TCE results from 2002 through 2006. Figures 2 through 15 from the 2007 Annual Performance Report are also included to show TCE concentration trends from the RI for each of the wells. Observations from the last five years of sampling results are as follows:

Deep Bedrock System

- With the exception of sampling conducted in February 2004 during a pumping cessation test, TCE concentrations in samples collected from DBR extraction well REM-1 have shown a general downward trend in the last five years. In the last five years, values have ranged from 52 µg/L to 10.6 µg/L. The February 2004 sampling event found TCE at a concentration of 407.0 µg/L indicating a significant concentration rebound effect during the cessation test.
- TCE has not been detected above the reporting limit of 1.00 µg/L in any samples collected from DBR monitoring wells SSC-2B, SSC-4B, and SSC6B. The same is true for monitoring well SSC-3B with the exception of a sample result of 1.2 µg/L in 2005.
- TCE has not been detected in any of the active Municipal Wells CW-3, CW-4, and CW-5. CW-2 has been abandoned and closed for reasons not associated with the SSC site.

Shallow Bedrock System

- There are no monitoring points providing data that could be used to define a clean southern boundary of the plume.

- TCE concentrations in samples collected from REM-2 increased from 1,000 µg/L in 2000 to 6,650 µg/L in 2002. The latest sample from 2006 shows a concentration of 3,940 µg/L.
- TCE concentrations in samples collected from SSC-6C spiked in 2002 to 14,700 µg/L from the previous reading of 6,730 µg/L. Concentrations have been on a decreasing trend since 2002, with the 2006 reading at 7,760 µg/L.
- TCE has never been detected above the laboratory reporting limit (recently changed to 1.00 µg/L) in samples collected from SBR monitoring wells to the east (SSC-1A), north (SSC-4A), and southeast (SSC-23).
- TCE concentrations in samples collected from SBR monitoring well SSC-3A (south) have shown a decreasing trend in the last five years ranging from 37.7 µg/L in 2002 to 7.6 µg/L in 2006, with a high of 39.6 µg/L in 2003.

Unconsolidated/Fractured Shallow Bedrock System

- There are no monitoring points providing data that could be used to define a clean southern boundary of the plume.
- TCE concentrations in samples collected during the annual monitoring events from UFSB extraction well SSC-29 have remained relatively constant, fluctuating between 1,730 µg/L to 1,360 µg/L.
- TCE concentrations in samples collected during the annual monitoring events from UFSB extraction well SSC-30 have been on a downward trend since 2002, with a high of 625 µg/L in 2002 to a low of 41.6 µg/L in 2006. Wells in this system may be directly influenced by recharge from precipitation events and/or infiltration from a water supply line in the area that may be leaking.
- Some of the treated plant effluent is discharged to the horizontal well in lieu of discharge to the sewer. TCE concentrations in discharged, treated groundwater are below the reporting limit of 1.00 µg/L. Therefore, TCE concentrations in fluid discharged to the horizontal well are below the reporting limit of 1.00 µg/L.
- TCE concentrations in samples collected from the UFSB extraction well SSC-31 have exhibited a decrease from a high of 30.6 µg/L in 2002 to a low of 1.9 µg/L in 2005. The TCE concentration for 2006 was 10 µg/L.
- TCE concentrations in samples collected from UFSB monitoring well SSC-11 have been variable in the last five years with a TCE concentration of 336 µg/L in 2002, 1,260 µg/L in 2004, and back down to 944 µg/L in 2006.
- TCE concentrations in samples collected from UFSB monitoring well SSC-20 have been variable but have been on a general downward trend since 2002. In 2006, the TCE concentration was 5,770 µg/L. Reduction in TCE concentrations in this well appears slow given the close proximity and similar screen depth to extraction well SSC-30.
- TCE concentrations in samples collected from UFSB monitoring well SSC-24 have remained relatively stable over the last five years. The TCE concentration was 1,020 µg/L in 2002 and 1,050 µg/L in 2006, with a low of 453 µg/L in 2005. This well is located very close to extraction well SSC-30 but has a screen depth 40 feet below that of extraction well SSC-30. The stable concentration in this well may be an indicator

groundwater monitored by SSC-24 (deeper portions of the UFSB) is not currently being captured by extraction well SSC-30.

- TCE concentrations in samples collected from UFSB monitoring well SSC-26 exhibited a general decrease ranging from a high of 33.1 µg/L to a low of 7.0 µg/L.
- Monitoring well SSC-27 was dry from 2002 through 2004 so no samples were collected. In 2005, the sample was below the reporting limit of 1.00 µg/L; and in 2006, the TCE concentration was 1.3 µg/L.
- TCE concentrations in monitoring well SSC-32 have shown a slightly decreasing trend over the last five years.
- TCE has never been detected in any samples collected from Roberts Spring.

F. Site Inspection

A site inspection was completed on June 4, 2007. Representatives of the FYR team and site inspection participants included the Agencies, USACE, city of Republic, a representative from MRAC, and the operating contractor. A list of participants is included at the end of the site inspection checklist located in Attachment E. The inspection included the treatment system, monitoring and extraction wells, Roberts Spring, and general inspection of the SSC site proper.

The SSC site was found to be in very good condition. The exterior of the extraction and monitoring wells appeared to be well maintained (a deeper, interior inspection was not conducted; operational data provided the necessary information). The treatment building and all treatment system components appeared well maintained and in proper working order. Equipment, piping, and valves were properly labeled. The O&M manual, design documents, and maintenance records were all readily available. Site personnel demonstrated the capabilities of the control and monitoring system for the treatment plant. Overall the treatment system was found to be in good operating condition and well managed. There were two minor maintenance items identified:

- The labels on two of the flush-mounted wells were losing legibility, and no label was readily apparent or was identified by project personnel as extraction well SSC-30. While this is not a critical issue, it is one that merits attention during general site maintenance.
- A low hanging branch extends outside the fence from a tree located within the site fence (south fence, west side). This has the potential to make site access easier for vandals. Removal of the low hanging branch should resolve this problem.

G. Interviews

Interviews were conducted during the site inspection. The operating contractor provided information regarding O&M of the existing pump and treat system, implemented and/or planned system upgrades or opportunities for optimization, and identified critical aspects of system operation that may require attention prior to the next FYR. Any substantive issues identified during the interview are discussed further in Section 7.

7. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes.

While the remedy is meeting the performance requirements outlined in the CD/SOW, there are some issues that may require further evaluation to ensure the protectiveness of the SSC site. These issues are discussed in this section; and issues and recommendations are summarized in Sections 7 and 8, respectively.

Remedial Action Performance

The RA continues to be operated as designed and is functioning properly. The system continues to operate within established design parameters and has achieved a downtime performance during the last five years that is consistent with and/or better than the established criteria. Hydraulic performance criteria (drawdown and rolling average annual levels) established in the CD/SOW or modifications approved by the Agencies have been satisfied for all three hydrogeologic units, and the sewer discharge limits have been met.

The original estimate for remedy completion was a 40-year RA schedule. Based on the analysis provided in the Five-Year Performance Report completed in 2006, the RA is proceeding as expected and contaminant concentrations within groundwater are being reduced. According to the Five-Year Performance Report prepared by MRAC in 2006, long-term trending indicates the progress toward achievement of remediation goals is ahead of schedule.

System Operations/Operation & Maintenance

The operating procedures as implemented continue to provide for an effective response action. An increase in RA maintenance costs has resulted from the need to replace equipment that had reached the end of serviceable life. These activities are normal and are not in this case indicative of poor maintenance or aggressive deterioration of materials. The increase in costs as a result of these activities does not indicate a problem with system operations or O&M.

Opportunities for Optimization

Optimization efforts (horizontal well) have been conducted at the SSC site. Several opportunities for optimization are currently under review and will be implemented as appropriate. As an example, daughter products resulting from the degradation of TCE have been detected in the extraction wells in each of the hydrologic units and in a few of the monitoring wells in the UFSB unit. The detection of *cis*-1,2-DCE and vinyl chloride suggests biodegradation is occurring at the SSC site. An evaluation of this process and possible implementation of an enhanced bioremediation program at the SSC site may prove beneficial at reducing the time required to meet the RAOs.

Early Indicators of Potential Issues

Increased Pumping Rate at Extraction Well SSC-30

There has been an increase in the pumping rate required to maintain the required drawdown in extraction well SSC-30. Although a specific cause has not been identified with certainty, it is suspected it may be due to a leaking water supply line in the area. If this is the cause, an assessment of the impact on remedy performance and O&M should be conducted. Any substantive change in the system that results from artificial or natural influence should be evaluated to determine whether baseline operating assumptions are still valid.

The TCE concentration provided by extraction well SSC-30 has noticeably decreased in the last few years. Although there is a possibility this could be the natural progression of the remedy as contaminant concentrations decrease, it is possible a source of clean water (either natural or artificial) is being introduced into the system diluting the water extracted and potentially changing the hydraulics of the system. The resultant increased pumping rate also increases operation costs (treatment and disposal).

Change in Pump Intake Elevation in Extraction Well SSC-30

Extraction well SSC-30 was originally constructed for a pump elevation of approximately 1,224 feet above mean sea level (or 80 feet bgs). However, due to sediment infilling of the borehole (siltation), the pump intake was set at approximately 24 feet bgs. This change in the pump intake elevation may reduce the effectiveness of this well at removing contaminants particularly in the lower portion of the UFSB. This does not represent a short-term protectiveness issue but may impact long-term protectiveness if the system is not able to meet remedial goals in the prescribed time frame.

Limits of Plume in SBR and UFSB

The limits of the plume in the SBR and UFSB are not fully defined using the existing monitoring well network and available data. Monitoring well SSC-3A is the southern-most well installed in the SBR and had a TCE concentration greater than 200 µg/l at the time of installation. In the UFSB, the southern-most monitoring wells are SSC-26 and SSC-27. When installed, SSC-26 and SSC-27 had TCE concentrations in the range of 75 µg/l and 260 µg/l, respectively. Although the remedy appears to be effective at reducing the TCE concentrations in the vicinity of these wells, it is uncertain how far south the plumes extend and how protectiveness is impacted.

Implementation of Institutional Controls and Other Measures

Section 710.150 of the *Republic City Code* prohibits construction of wells, cisterns, or facilities for the production of groundwater. Construction of new wells, cisterns, or facilities is allowed only for the purpose of groundwater remediation or monitoring within the area as defined by the following streets: Anderson Street, West Avenue, Miller Road, and Hampton Avenue. This

ordnance prevents future use of groundwater so the exposure pathway associated with household and potable uses remains incomplete.

Controls such as fencing, warning signs, and well locks are in place. These controls prevent casual access to the treatment facility and other components of the RA. Access to extracted groundwater is restricted to authorized plant operators and other personnel. Although these controls are in good condition, there is a large tree within the site fence with a low hanging branch extending outside the fence. This simplifies access to the SSC site by vandals. Removing the low hanging branch would eliminate this problem. No other actions appear necessary.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?

Yes.

Changes in Standards and To Be Considered(s)

Chemical-specific ARARs and To Be Considered(s) [TBC(s)] were identified in Appendix A of the ROD and included: Federal 40 CFR 141 (safe drinking water standards), Missouri 10 CSR 60.4 (drinking water standards), Missouri 10 CSR 20.7 (water quality standards), and federal ambient water quality standards for aquatic life protection. These numeric criteria are established to protect human health from ingestion of contaminants in groundwater and surface water and from ingestion of potentially contaminated aquatic organisms. Numeric criteria also include acute and chronic ambient water quality levels for protection of aquatic life. As the remedy progresses toward restoring the three groundwater hydrologic units to unrestricted use, the same ARARs that were valid when the remedy was chosen will need to be met when the groundwater is considered fully remediated. Note numeric values for inorganics, total chromium, copper, lead, mercury, nickel, and zinc along with all organics detected in groundwater during the RI were listed in the ROD and initially identified for monitoring. However, the RD report concluded the remedial discharge fluids were insignificant components of the sewer system's fluids which enter the POTW, the levels measured during RD were below the federal and state drinking water standards, and no pretreatment of fluids from the SSC site was required. Eliminating inorganics from monitoring was approved by DNR in a letter dated February 14, 1990. Numeric values current at the time of this FYR have been compiled and are provided in Table 3 (Attachment B).

Action-specific ARARs selected at the time of the remedy are still valid. Provided institutional controls remain in place to prevent potable well installation in the contaminant plume and provided the contaminant plume is being captured and not reaching a classified water body (where ambient water criteria apply), any changes in ARARs and/or TBC(s) will not impact the protectiveness of the remedy since exposure pathways remain incomplete.

Changes in Exposure Pathways

There has been a recent focus nationwide on the vapor intrusion to indoor air pathway especially on sites with TCE contamination. Vapor intrusion can pose health concerns for occupants of buildings with basements, with slab-on-grade, and also with crawl spaces. EPA's draft guidance for the vapor intrusion pathway identifies steps for screening sites that may be of concern. Among the steps are identifying sites with contaminants of sufficient volatility and toxicity, identifying sites with occupied buildings located within 100 feet vertically or horizontally of subsurface contamination, and comparing site data to media-specific target levels. Given the volatility of contaminants at the SSC site, the shallow depth to the water table (approximately 10 feet bgs), and the proximity of occupied buildings to the plume (included among these a daycare center, homes, and apartment complexes) further evaluation of this potentially completed exposure pathway is warranted. TCE concentrations in the UFSB groundwater wells ranged up to 5,950 µg/L (compared to a 5 µg/L target screening level set to protect to a target 1E-06 cancer risk).

While there have been no changes in the SSC site conditions that create new exposure pathways, a daycare center is now located immediately north of the treatment building across East Elm Street. This brings a sensitive receptor population near the SSC site and creates a potential for outdoor air exposure. An evaluation of the discharge height for the air stripper was completed to determine if there is a potential for impacting the center. To ensure VOC emissions from groundwater treatment will not result in an exposure pathway at the daycare center, the treatment facility now only pumps the most contaminated wells at night. The nightly pumping is sufficient to maintain the requirements set forth in the CD/SOW.

The daycare center, while located upgradient of the plume, is in close proximity horizontally of subsurface contamination. An evaluation into the vapor intrusion to indoor air pathway is warranted.

No new exposure pathways for ecological receptors were identified for this FYR.

Changes in Toxicity and Other Contaminant Characteristics

Several toxicity factors have changed since the time the BLRA was conducted. Of significance is the fact there are now inhalation toxicity values for evaluating cancer and noncancer adverse health effects that were not previously available. Most important of the new information are the toxicity data compiled as part of the reassessment of TCE toxicity. While conclusions made in the reassessment are still under review, research studies do indicate TCE toxicity is greater than previously thought through both oral and inhalation routes of exposure. The final assessment of TCE is expected soon.

The newly available inhalation toxicity factors coupled with the recent focus on vapor intrusion to indoor air pathway warrant confirming the protectiveness of the remedy.

Changes in Risk Assessment Methods

The BLRA for the RI was conducted under the *Superfund Public Health Evaluation Manual* (SPHEM) (EPA 1986). The current practice is to use the *Risk Assessment Guidance for Superfund* (RAGS) (EPA 1989). While much of the methodology is the same, the process for selecting chemicals to be evaluated in the BLRA is somewhat varied. Selection of *indicator chemicals* under the old guidance tended to be more arbitrary, and more chemicals could be eliminated than under the methodology described in RAGS for selecting *COPCs*. However, the remedy is designed to address all VOCs and not just *indicator* VOCs. This plus the requirement all VOCs must meet ARARs make the impact of this change in methodology inconsequential. Receptor populations, contact media, exposure pathways, and assumptions remain valid today.

While EPA has issued new guidance for conducting ecological risk assessments since the BLRA was written, the initial step of the ecological evaluation process remains the same. Under problem formulation, the likelihood of exposure pathways is evaluated. The BLRA concluded exposure opportunity and the potential for ecological risk at the SSC site were minimal. Continued urbanization in the area renders the SSC site an unattractive habitat. Roberts Spring is a downgradient surface water body identified as being in hydraulic connection with the groundwater system at the SSC site. If the plume was to migrate to Roberts Spring, there may be a need to evaluate the impact to ecological receptors. However, samples at Roberts Spring continue to be nondetect. In addition, ambient water quality criteria have been identified as targets for this location thereby ensuring protection to aquatic organisms.

Expected Progress Toward Remedial Action Objectives

In September 2006, MRAC submitted the third Five-Year Performance Report. In this report, it is estimated the RA is greater than 85 percent complete. It also anticipated groundwater cleanup levels will be met within approximately 15 years.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No.

No ecological targets were identified during the BLRA, and none were identified during the FYR; therefore, monitoring of ecological targets is not necessary. Even though this monitoring is not necessary, annual VOC sampling, especially of TCE, is recommended at Roberts Spring. No weather-related events have affected the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

8. ISSUES

Issue	Description	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1	Siltation of extraction well SSC-30	N	Y
2	Potential leak in water supply line in the vicinity of extraction well SSC-30	N	Y
3	Confirmation of appropriate coverage by the institutional controls designed to protect against exposure to contaminated groundwater; Delineation of TCE at or below the MCL in the UFSB and SBR	*	*
4	Vapor Intrusion Pathway	*	*
*Potential to affect protectiveness; more information must be collected and analyzed prior to making a final determination.			

9. Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Determine the impact of siltation on remedy performance and effectiveness. Potential solutions include but are not limited to: install a new well with deeper pump intake, install a new casing, and screen inside the existing well.	MRAC	DNR EPA	September 2008	N	Y
2	Assess the impact of the leaking/potentially leaking water line in the vicinity of extraction well SSC-30; provide an evaluation in terms of remedy, performance, and effectiveness; and provide recommendations for mitigating or eliminating ancillary issues stemming from the water line leak.	MRAC	DNR EPA	September 2008	N	Y
3	*Determine the most effective* means for confirming appropriateness of the institutional control coverage area; possible paths include but are not limited to new monitoring wells to enhance plume delineation, downgradient private well survey, and general increase in institutional control coverage area.	MRAC	DNR EPA	September 2008	N	Y
4	Continue evaluation of the vapor intrusion exposure pathway; possible paths include but are not limited to soil gas samples, indoor air monitoring, plume delineation, and modeling.	MRAC	DNR EPA	September 2008	N	Y

10. PROTECTIVENESS STATEMENTS

Based upon the available data, the assessment of this FYR found the remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup standards. Currently, all threats at the SSC site have been addressed through hydraulic and institutional controls of the groundwater contamination.

Vapor intrusion exposure pathway

There has been a recent refocus nationwide on the vapor intrusion to indoor air pathway. This is especially true for sites with TCE contamination. This issue was considered during the RI but was not found to be a problem. However, for several reasons MRAC is currently collecting soil vapor data.

Plume delineation in the SBR and UFSB

The nature of contaminant transport in the UFSB and monitoring points in the SBR and UFSB available for analysis limit the certainty of plume delineation. While the existing extraction well network was designed to capture contamination and maintain or reduce the plume limits, the data available to demonstrate this effect do not fully provide certainty in regard to protection associated with the existing institutional controls. An assessment of potential exposure points (i.e., private wells) outside the limits of the well restriction institutional control may provide sufficient data to demonstrate current protectiveness. It may also help in determining if any adjustments to the institutional controls are necessary to ensure future protectiveness.

11. NEXT REVIEW

The next FYR will be due in September 2012.

The trigger date for the due date of the next FYR is the approval of this FYR by EPA demonstrated by signature.

Attachment A

FIGURES

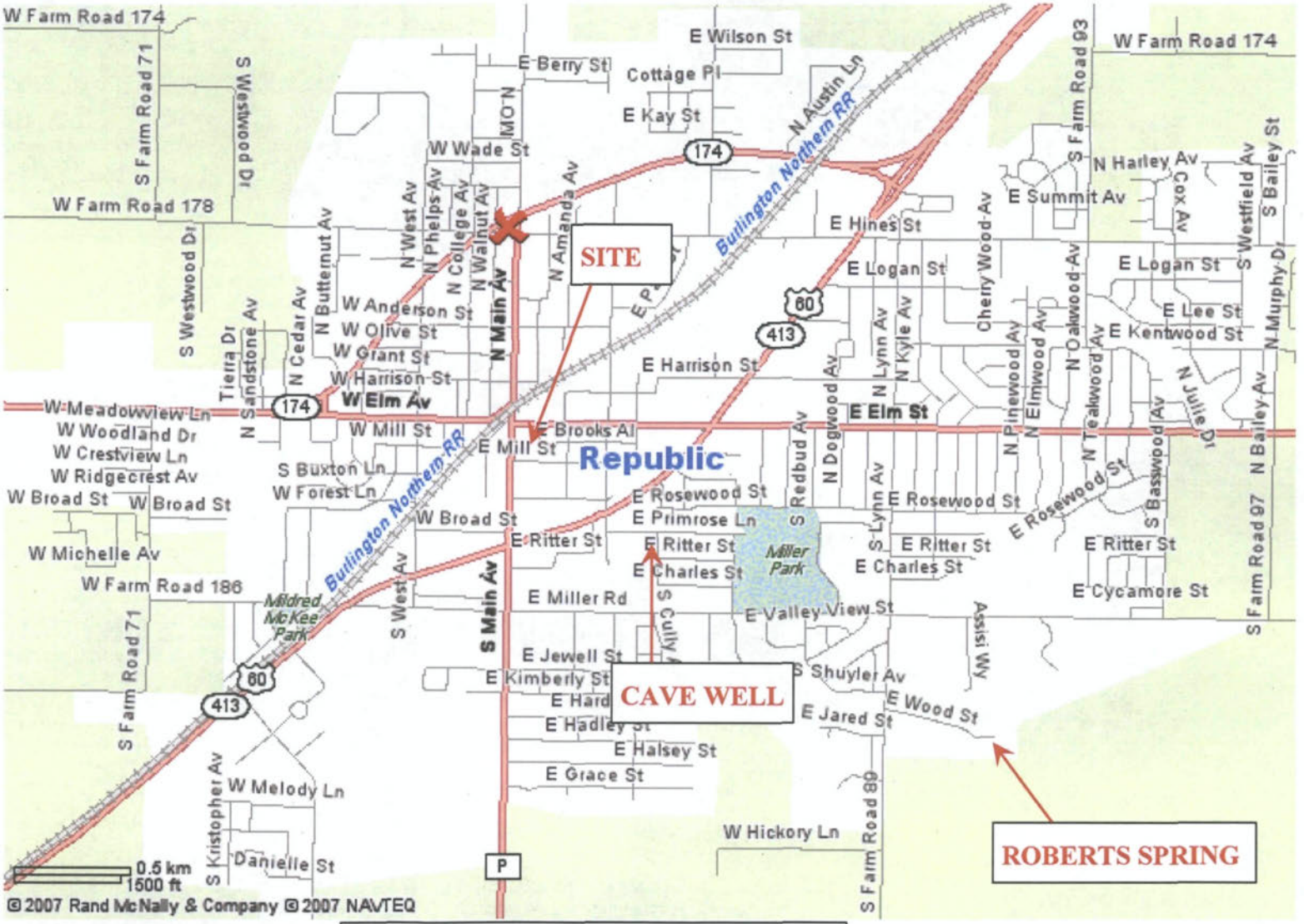
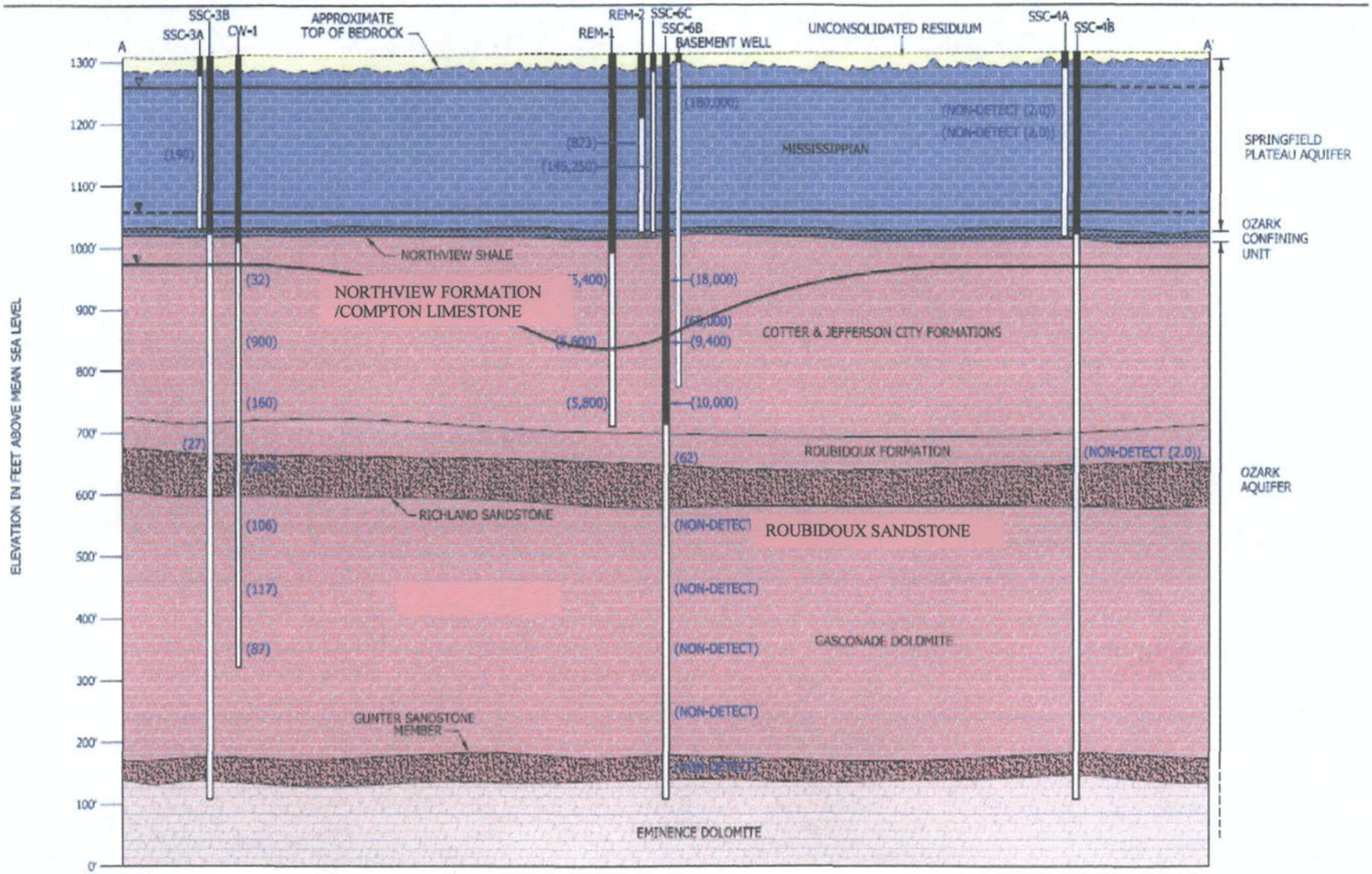


FIGURE 1: SITE LOCATION

FIGURE 2. GEOLOGIC CROSS SECTION



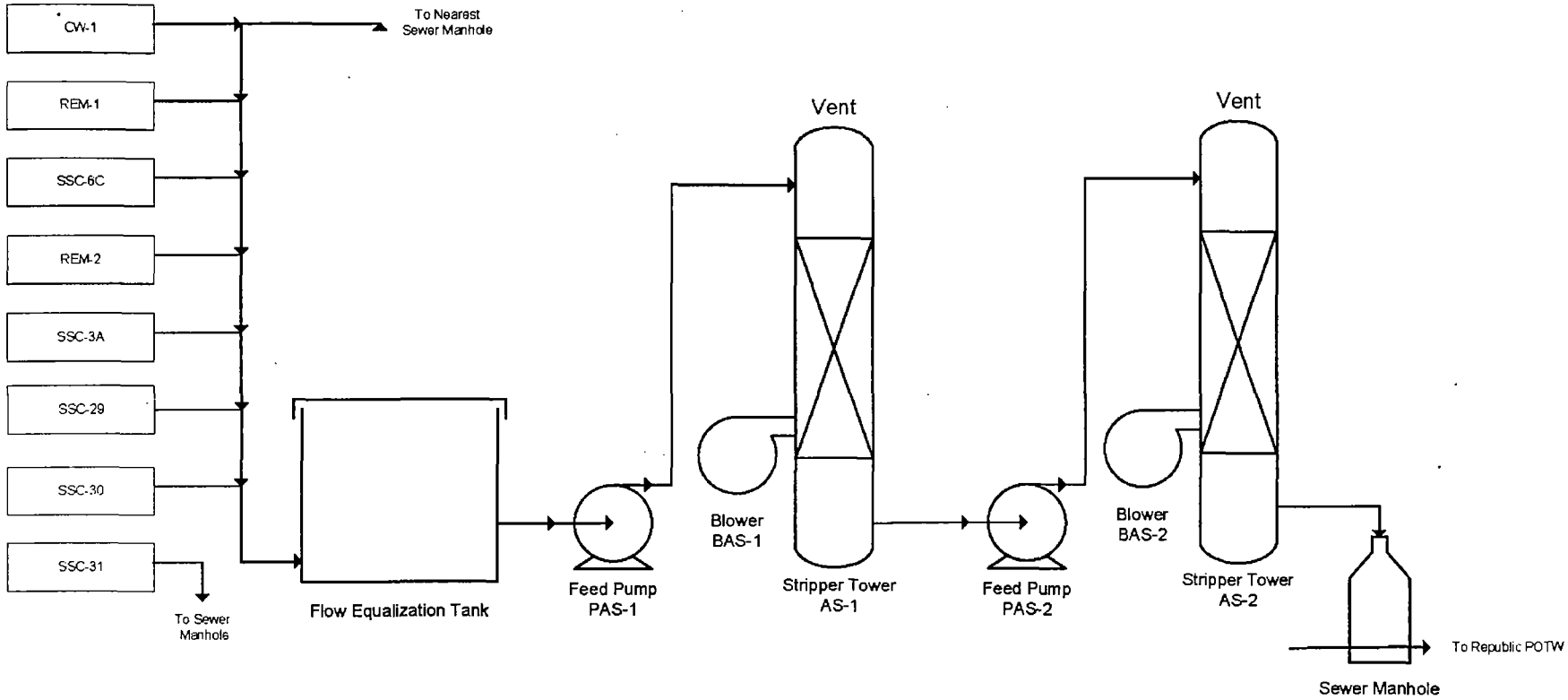
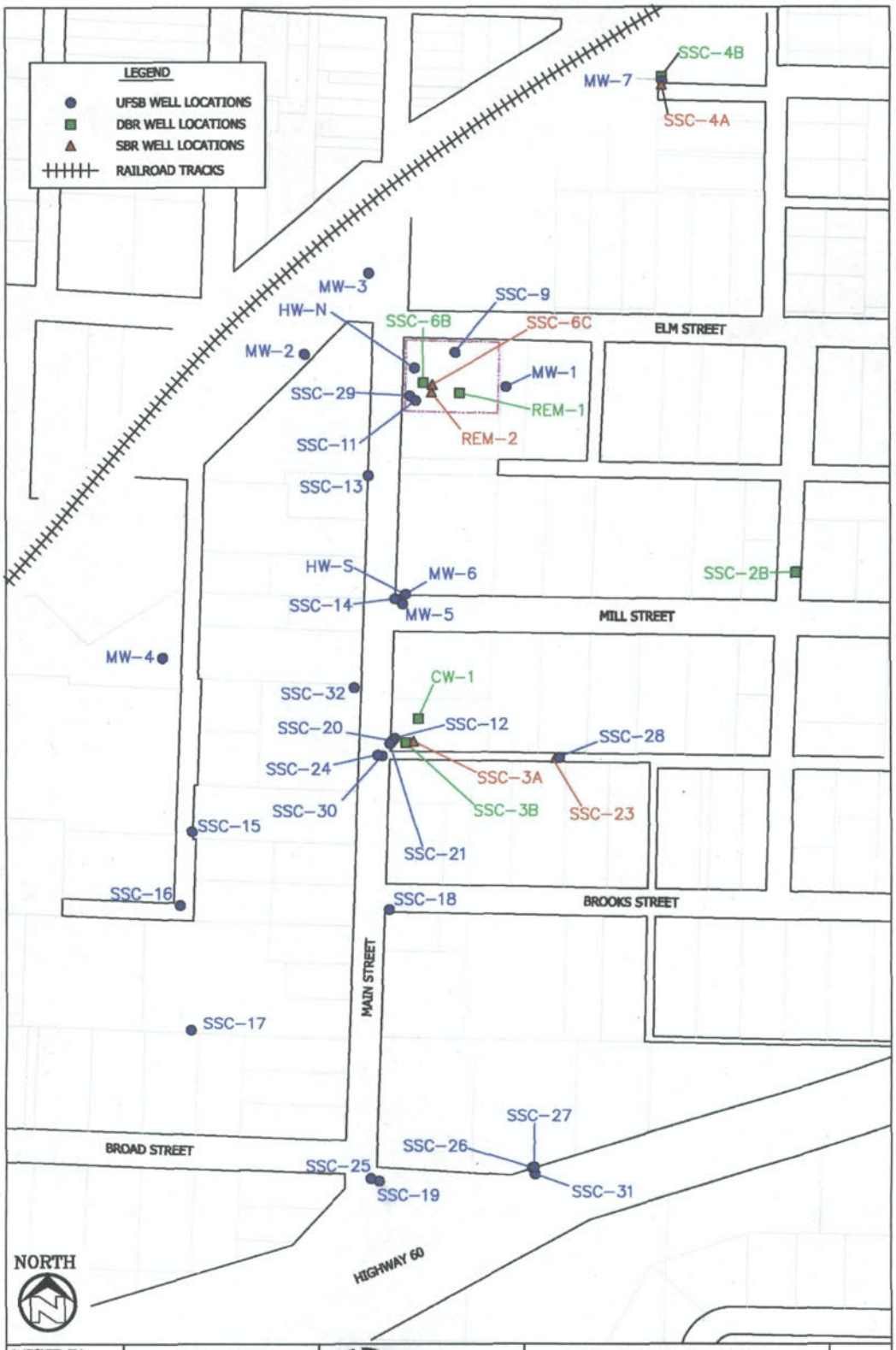


Figure 3 – Schematic of Pump and Treat System



CHECKED BY: M. KENWORTHY	SCALE (FEET) 0 82 164 328 APPROXIMATE	1016 W. BATTLEFIELD SPRINGFIELD, MO 65807 PH. (417) 890-9500 FAX: (417) 823-9659 ENVIRONMENTAL WORKS INC.	SITE WELL NETWORK	FIGURE 4
E.W.I. # 60185P DRAWN BY: MEK AUG. 29, 2006			FORMER SOLID STATE CIRCUITS SITE 108 S. MAIN STREET REPUBLIC, MISSOURI	

Attachment B

ADDITIONAL TABLES

TABLE 3: NUMERIC VALUES FOR CHEMICAL-SPECIFIC ARARS (current as of July 2007)									
	NATIONAL DRINKING WATER STANDARDS		STATE OF MISSOURI WATER QUALITY STANDARDS					NATIONAL WATER QUALITY CRITERIA	
								Human Health Consumption	
Organic Contaminants	MCL	MCLG	MCL	AQL	HHF	DWS	GRW	Water and Organism	Organism Only
	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Acrolein					780	320	320	198	390
Benzene	0.005	0	0.005		71	5	5	2.2	51
Bis(2-ethylhexyl) phthalate					5.9	6	6	1.2	2.2
Butyl Benzyl Phthalate					5200	3000	3000	1500	1900
Chlorobenzene	0.1	0.1			21000	100	100	130	1600
Chloroethene									
Chloroform	0.1							5.7	470
1,1-Dichloroethane								0.38	37
1,1-Dichloroethene	0.007	0.007	0.007		3.2	7	7	330	7100
1,2-Dichloroethane	0.005	0	0.005		99	5	5	0.38	37
cis 1,2-Dichloroethylene	0.07	0.07	0.07			70	70		
trans 1,2-Dichloroethylene	0.1	0.1	0.1		140000	100	100	140	10000
1,2-Dichloropropane	0.005	0	0.005					0.5	15
1,3-Dichloropropylene								0.34	21
Ethylbenzene	0.7	0.7	0.7	320		700	700	530	2100
Isophorone					2600	36	36		
Methyl Chloride					470	5	5		
Methylene Chloride					1600	4.7	4.7		
Phenol				100		100	300	4.6	590
Tetrachloroethene	0.005	0	0.005		8.85	0.8	0.8	0.69	3.3
Toluene	1	1	1		200000	1000	1000	1300	15000
1,1,1-Trichloroethane	0.2	0.2	0.2			200	200		
Trichloroethene	0.005	0	0.005		80	5	5	2.5	30
1,1,2-Trichloroethane	0.005	0.003			42	5	5	0.59	16
Vinyl Chloride	0.002	0	0.002		525	2	100	0.025	2.4

Note there were neither national nor state SMCLs available for the listed organics.
There were no national freshwater ambient water quality criteria for aquatic life available for the listed organics.
Numerical values for inorganics were not updated since monitoring was determined to not be required.

AQL = Protection of Aquatic Life
ARAR = Applicable or Relevant and Appropriate
DWS = Drinking Water Supply
GRW = Groundwater
HHF = Human Health Protection, Fish Consumption
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
mg/L = Milligrams per Liter
SMCL = Secondary Maximum Contaminant Level
ug/L = Micrograms per Liter

TABLE 4: NONCANCER TOXICITY INFORMATION COMPARISON								
	VALUES USED IN 1989				VALUES AVAILABLE IN 2007			
	Reference Doses				Reference Doses			
Chemical	Oral (mg/kg/day)	Ref.	Inhalation (mg/kg/day)	Ref.	Oral (mg/kg/day)	Ref.	Inhalation (mg/kg/day)	Ref.
1,1-Dichloroethane	1.2E-01	NCEA	1.38E-01	IRIS	1.0E-01	HEAST	1.4E-01	HEAST
1,1-Dichloroethene	9.0E-01	Health Effects Publ.	-		5.0E-02	IRIS	5.7E-02	IRIS
Trans-1,2-Dichloroethene	1.0E-02	NCEA	-		2.0E-02	IRIS	2.0E-02	R to R
Methylene Chloride	6.0E-02	Health Effects Publ.	-		6.0E-02	IRIS	8.6E-01	HEAST
1,1,1-Trichloroethane	9.0E-02	Health Advisory	3.0E-01	SPHEM	2.8E-01	NCEA	6.3E-01	PPRTV
Trichloroethene	7.4E-03	HEAST	-		-	CalEPA	1.7E-01	CalEPA
Trichloroethene					*4.0E-01*	*NCEA*	*1.0E-02*	*NCEA*
Vinyl Chloride	1.3E-01	Health Advisory	-		3.0E-03	IRIS	2.9E-02	IRIS

CalEPA = California Environmental Protection Agency
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NCEA = National Center for Environmental Assessments
PPRTV = Provisonal Peer Reviewed Toxicity Values
R to R = Route to route extrapolation

TABLE 5: CANCER TOXICITY INFORMATION COMPARISON									
Chemical	EPA Weight of Evidence	VALUES USED IN 1989				VALUES AVAILABLE IN 2007			
		Cancer Slope Factors				Cancer Slope Factors			
		Oral $(mg/kg/day)^{-1}$	Ref.	Inhalation $(mg/kg/day)^{-1}$	Ref.	Oral $(mg/kg/day)^{-1}$	Ref.	Inhalation $(mg/kg/day)^{-1}$	Ref.
1,1-Dichloroethane	C	9.10E-02	HEAST, NCEA	-		9.10E-02	IRIS	9.10E-02	IRIS
1,1-Dichloroethene	C	6.00E-01	IRIS	1.2	IRIS	-		-	
Methylene Chloride	B2	7.50E-03	IRIS	1.42E-02		7.50E-03	IRIS	1.60E-03	IRIS
Trichloroethene	B2	1.10E-02	IRIS	4.60E-03	HEAST, SPHEM, Health Effects Publ.	1.30E-02	CalEPA	7.00E-03	CalEPA
Trichloroethene						*4.00E-01*	*NCEA*	*4.00E-01*	*NCEA*
Vinyl Chloride	A	2.3	SPHEM, Health Effects Publ.	1.50E+00	HEAST, SPHEM, Health Effects Publ.	3.10E-02	IRIS	3.10E-02	IRIS

CalEPA = California Environmental Protection Agency
HEAST = Health Effects Assessment Summary Table
IRIS = Integrated Risk Information System
NCEA = National Center Environmental Assessment
SPHEM = Superfund Public Health Effects Manual

Attachment C

SUMMARY OF TCE DATA FROM LAST FIVE YEARS
AND
TCE TREND PLOTS

Summary of TCE Results in Last Five Years: 2002 to 2006

RA Monitoring Network Location	Sample Location	Annual TCE Results (ug/L)				
		2002	2003	2004	2005	2006
DBR Post-Closure Monitoring	CW-1	1.8J	3.5	5.9	(1.00)	2.14
DBR Remedial Extraction	REM-1	52	36.2	27	10.6	23.2
DBR Monitoring	SSC-2B	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
	SSC-3B	(1.00)	(1.00)	(1.00)	1.17	(1.00)
	SSC-4B	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
	SSC-6B	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
Municipal Wells	CW-2					
	CW-3	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
	CW-4	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
	CW-5	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
SBR Remedial Extraction	REM-2	6650	4600	5350	4850	3940
	SSC-6C	14700	9840	9120	6490	7760
SBR Monitoring	SSC-1A	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
	SSC-3A	37.7	39.6	29.5	17.4	7.56
	SSC-4A	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
	SSC-23	(1.00)	0.70J	(1.00)	(1.00)	(1.00)
UFSB Remedial Extraction	SSC-29	1650	1450	1640	1730	1360
	SSC-30	625	194	271	126	41.6
	SSC-31	30.6	20.9	22.9	1.86	10
UFSB Monitoring	SSC-11	336	963	1260	702	944
	SSC-20	8050	13400	8550	4160	5770
	SSC-24	1020	905	1230	453	1050
	SSC-26	33.1	19.3	21.3	6.95	7.75
	SSC-27				(1.00)	1.31
	Roberts Spring	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
	SSC-32	326	251	268	243	239

(1.00) - parenthesis denotes TCE not detected above reporting limit

FIGURE 2
TCE Concentration Trend In DBR Well REM-1
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

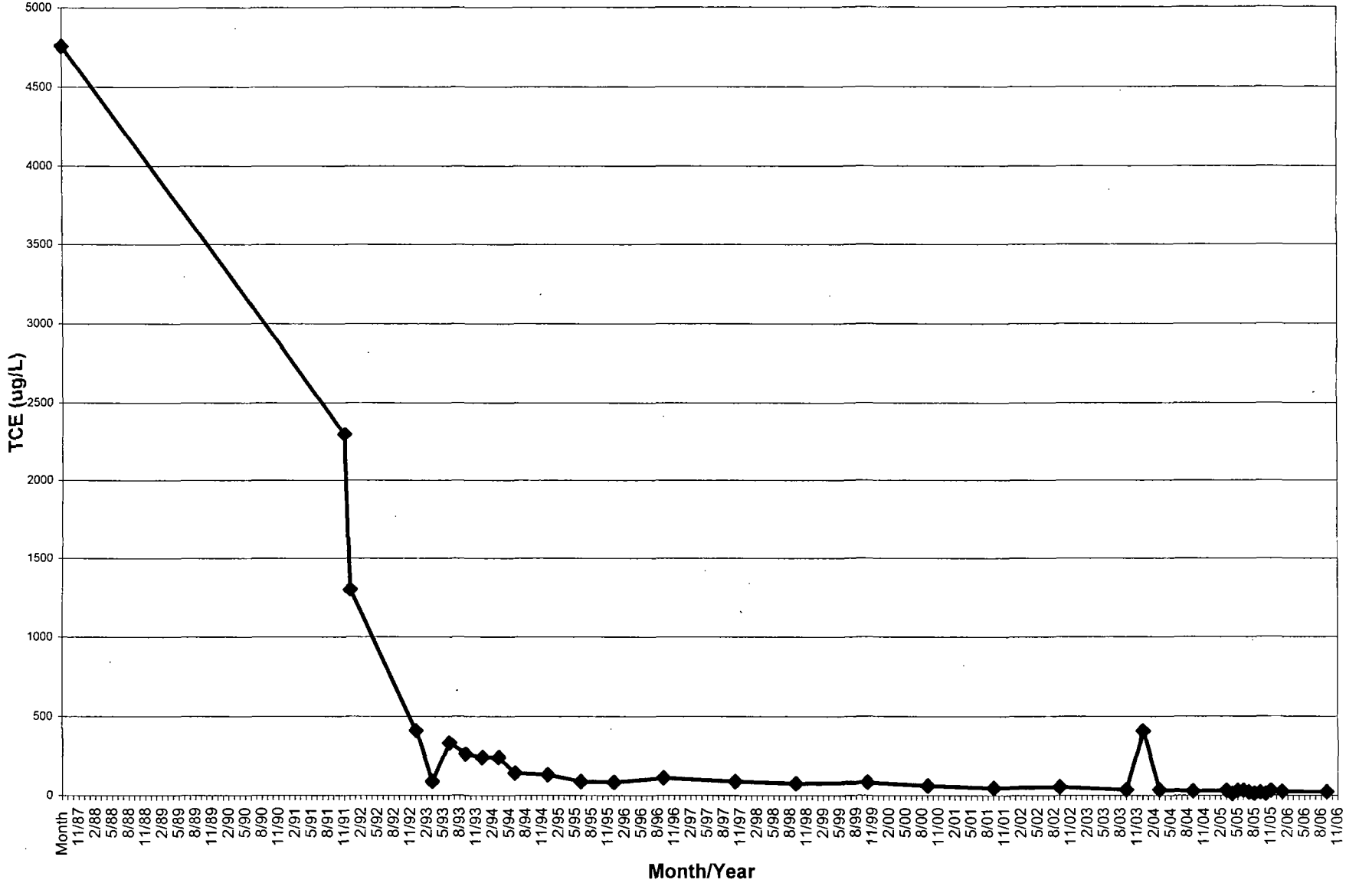


FIGURE 3
TCE Concentration Trend In DBR Well CW-1
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

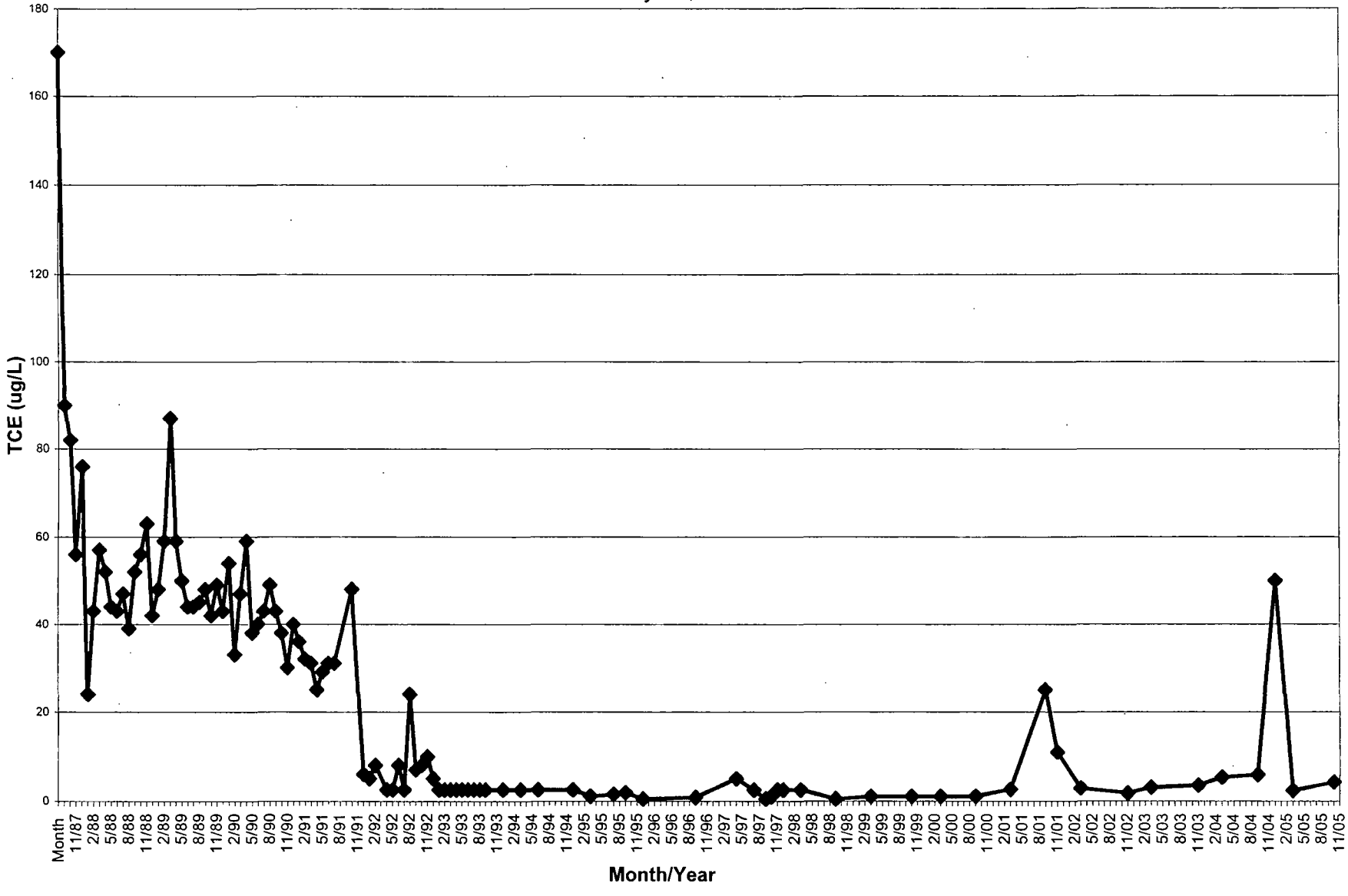


FIGURE 4
TCE Concentration Trend In SBR Well REM-2
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

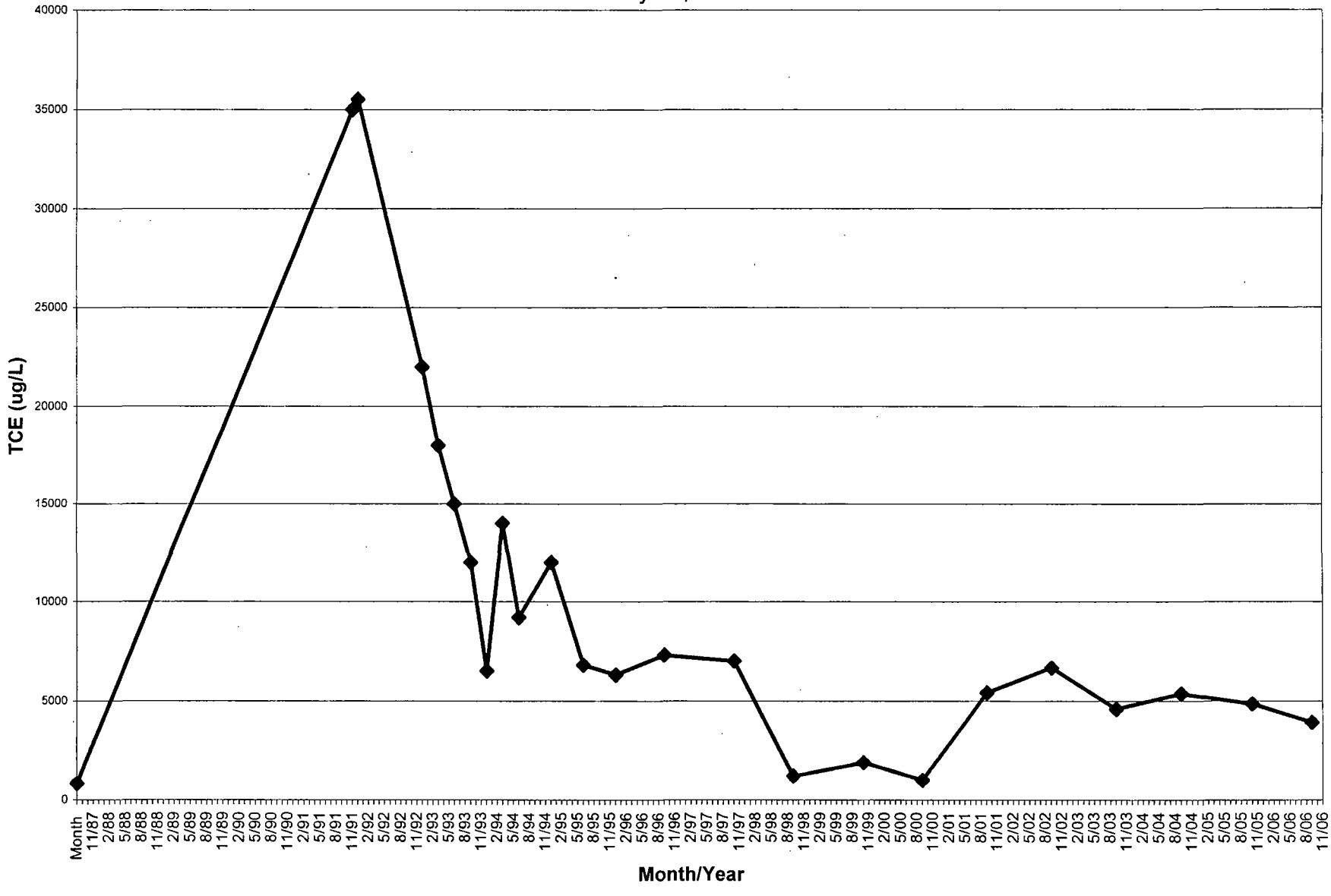


FIGURE 5
TCE Concentration Trend In SBR Well SSC-6C
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

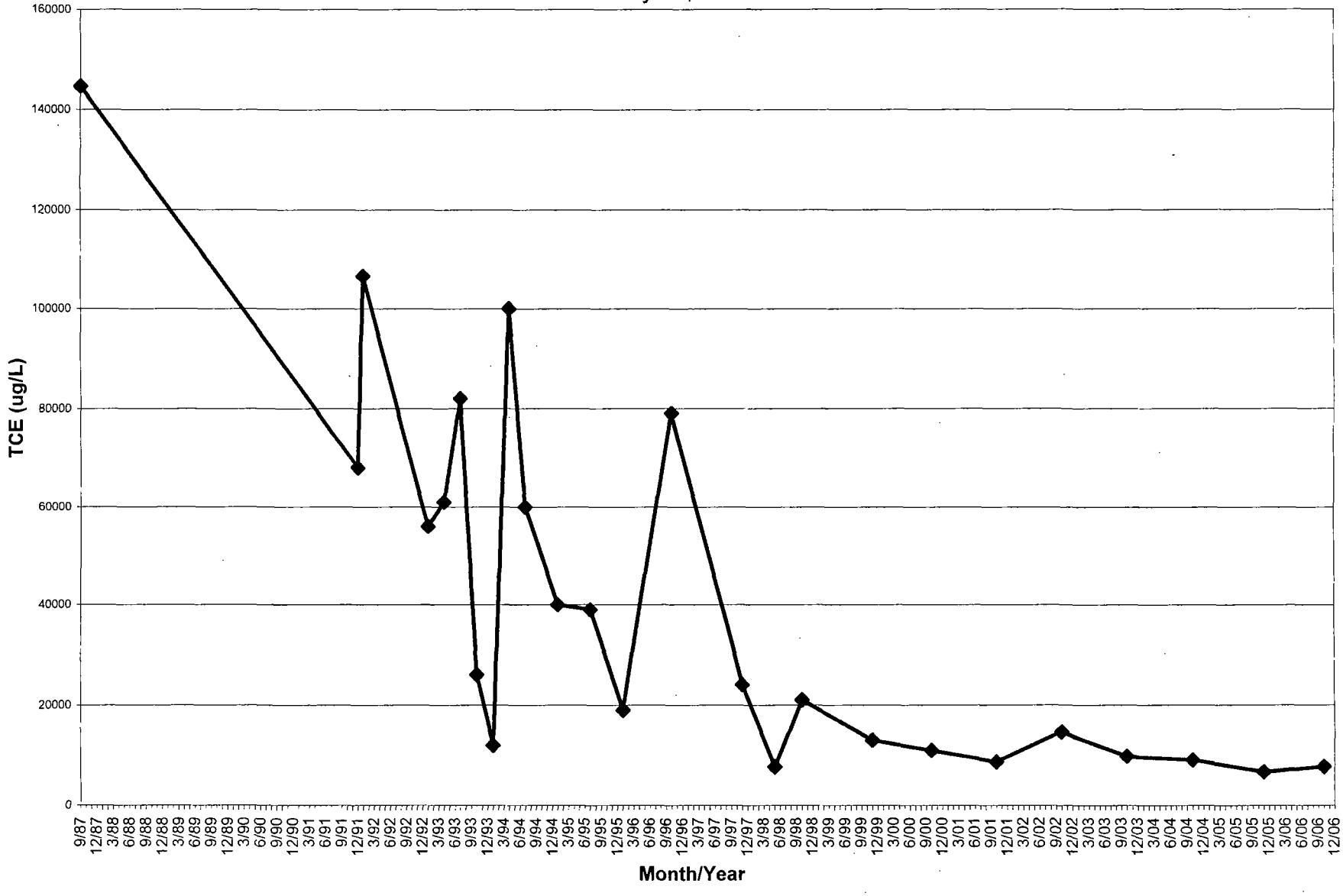


FIGURE 6
TCE Concentration Trend In DBR Well SSC-3A
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

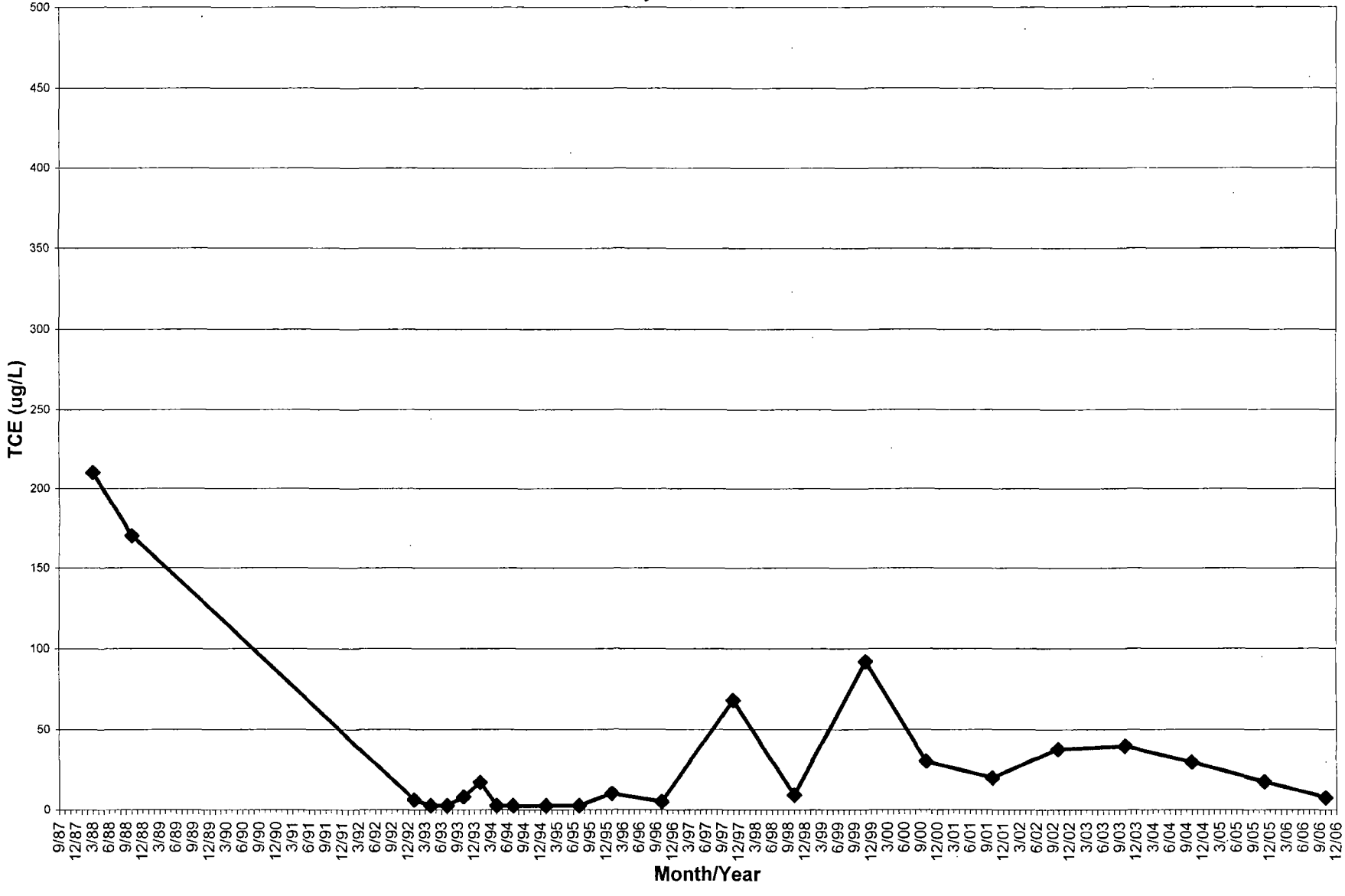


FIGURE 7
TCE Concentration Trend In UFSB Well SSC-29
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

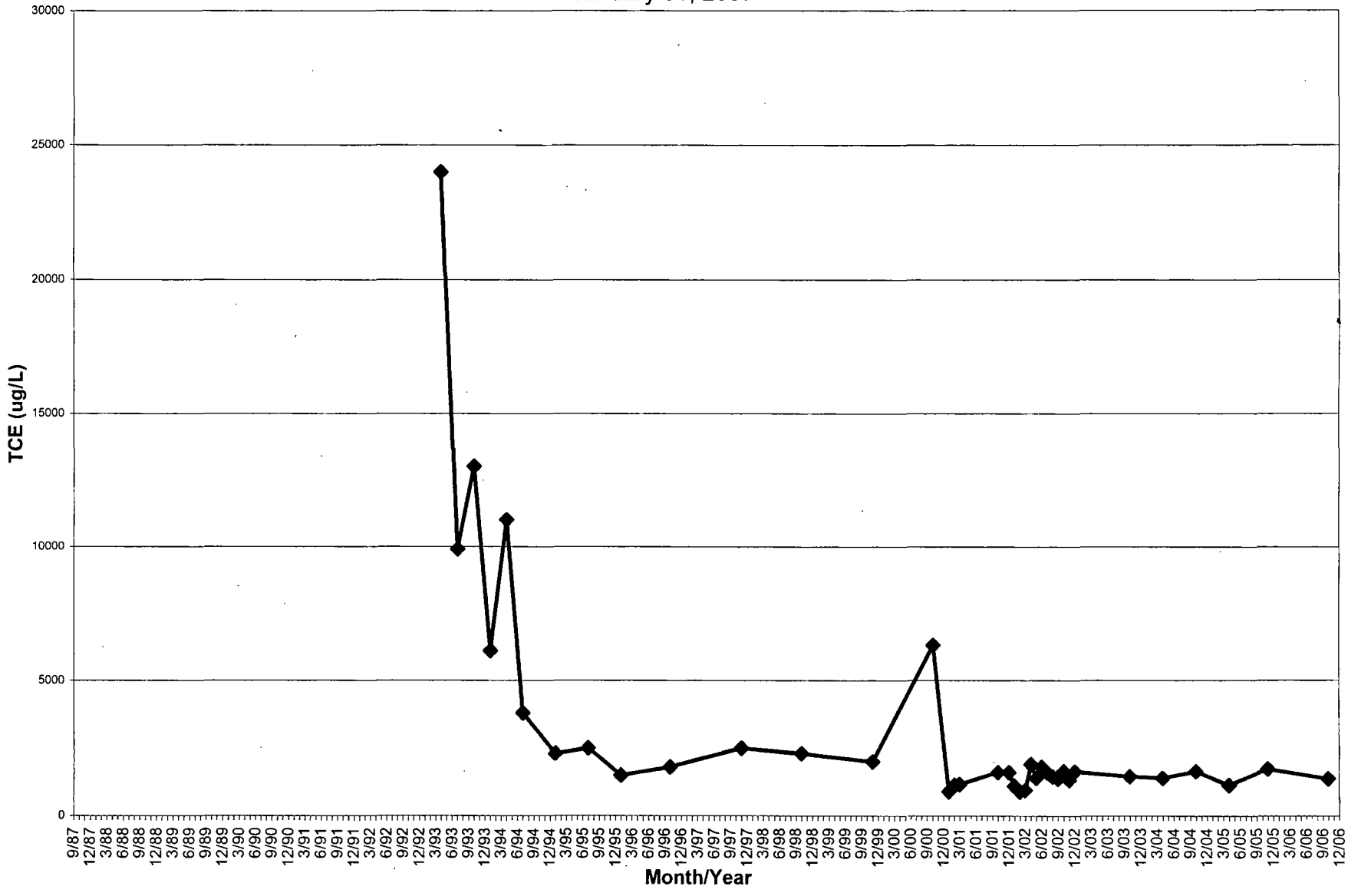


FIGURE 8
TCE Concentration Trend In UFSB Well SSC-30
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

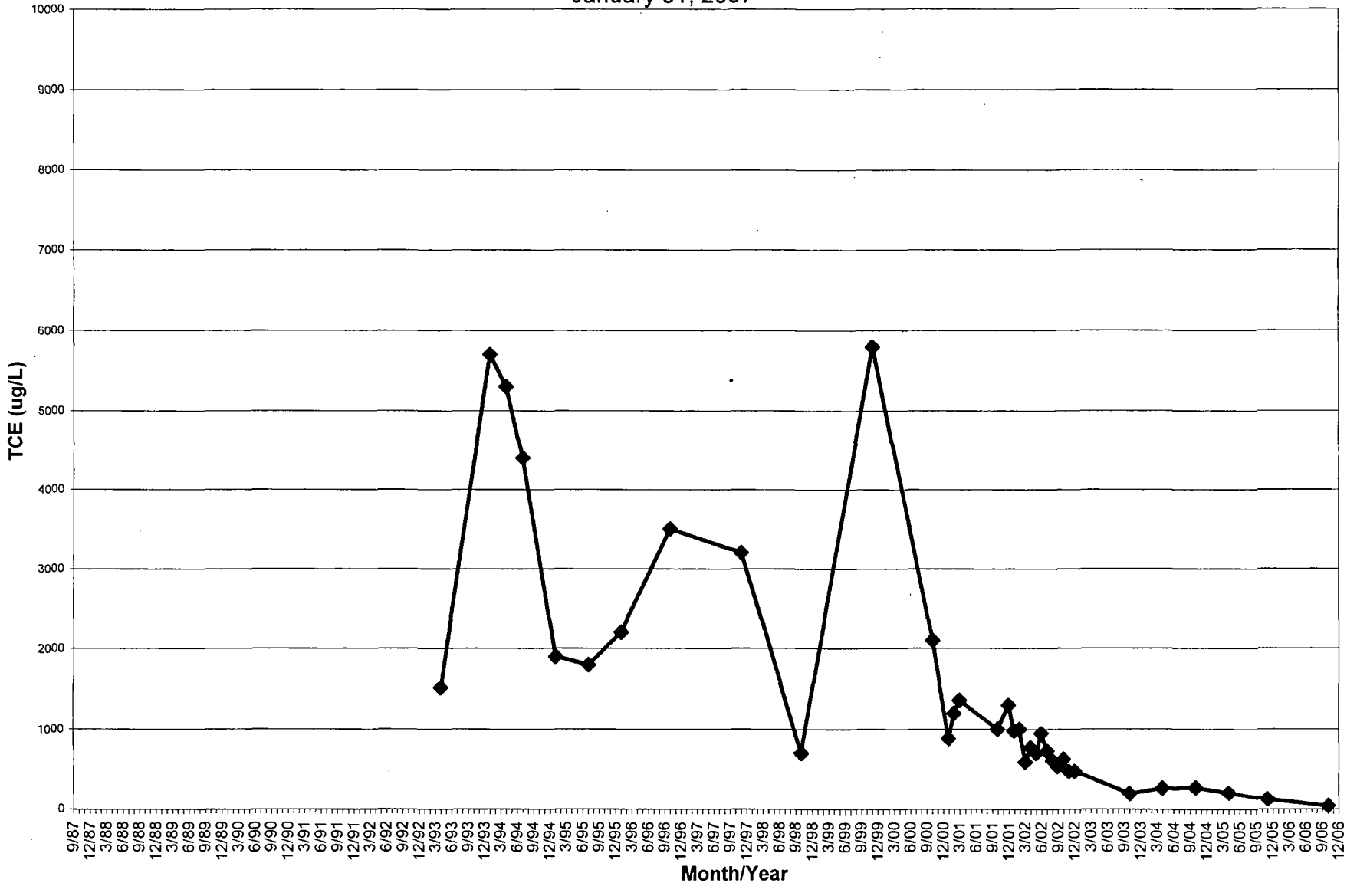


FIGURE 9
TCE Concentration Trend In UFSB Well SSC-31
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

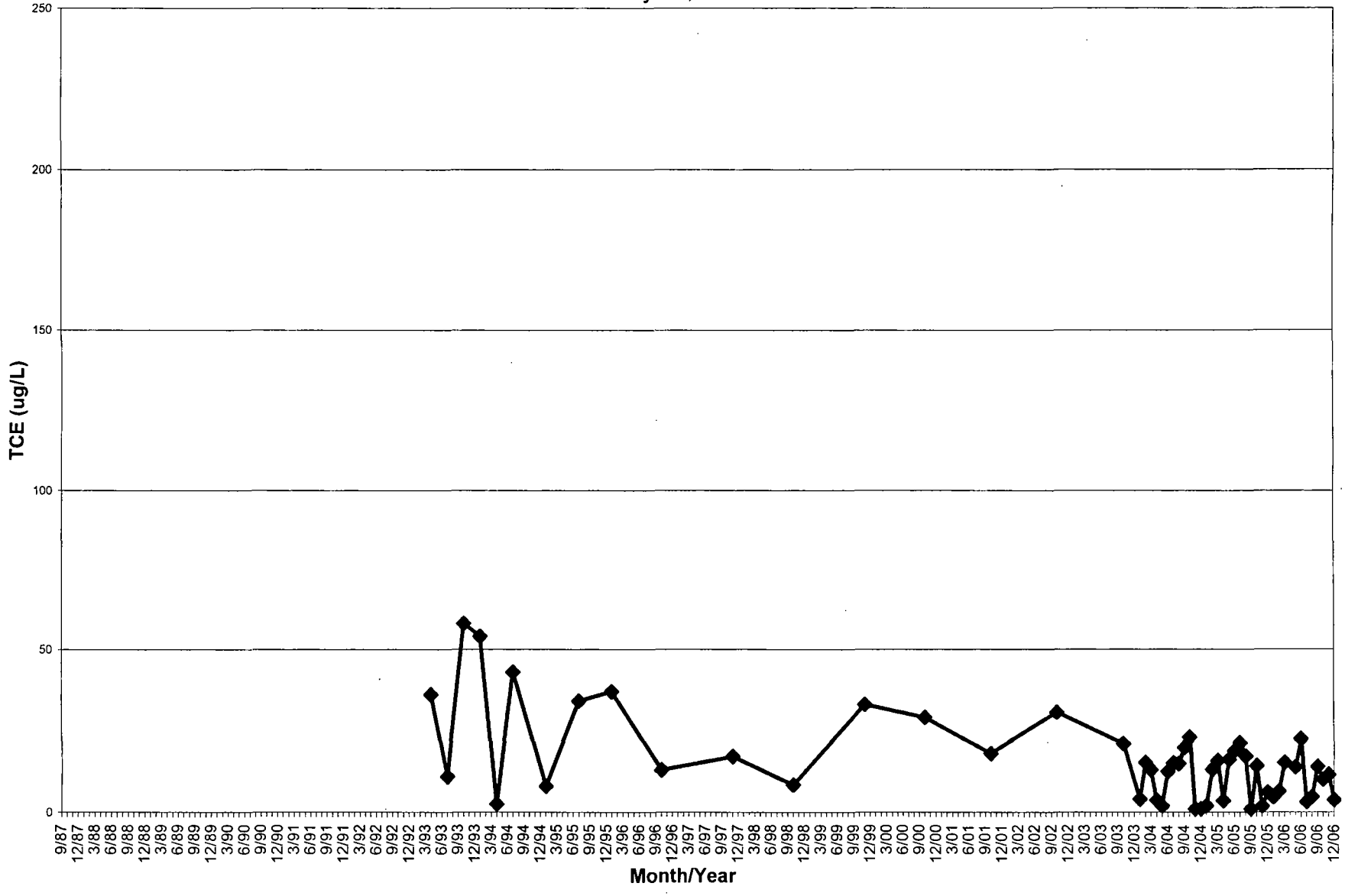


FIGURE 10
TCE Concentration Trend In UFSB Well SSC-11
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

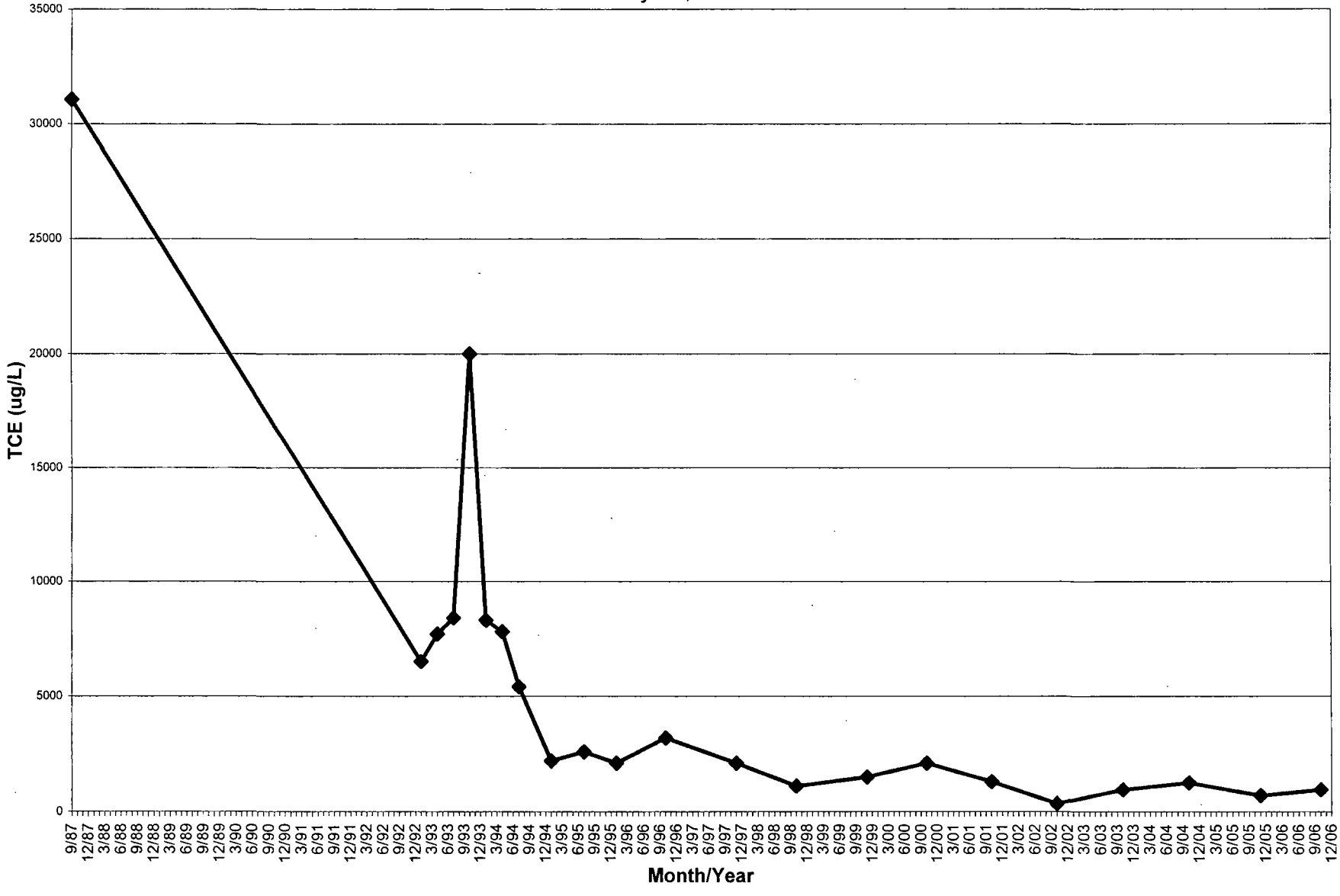


FIGURE 11
TCE Concentration Trend In UFSB Well SSC-20
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

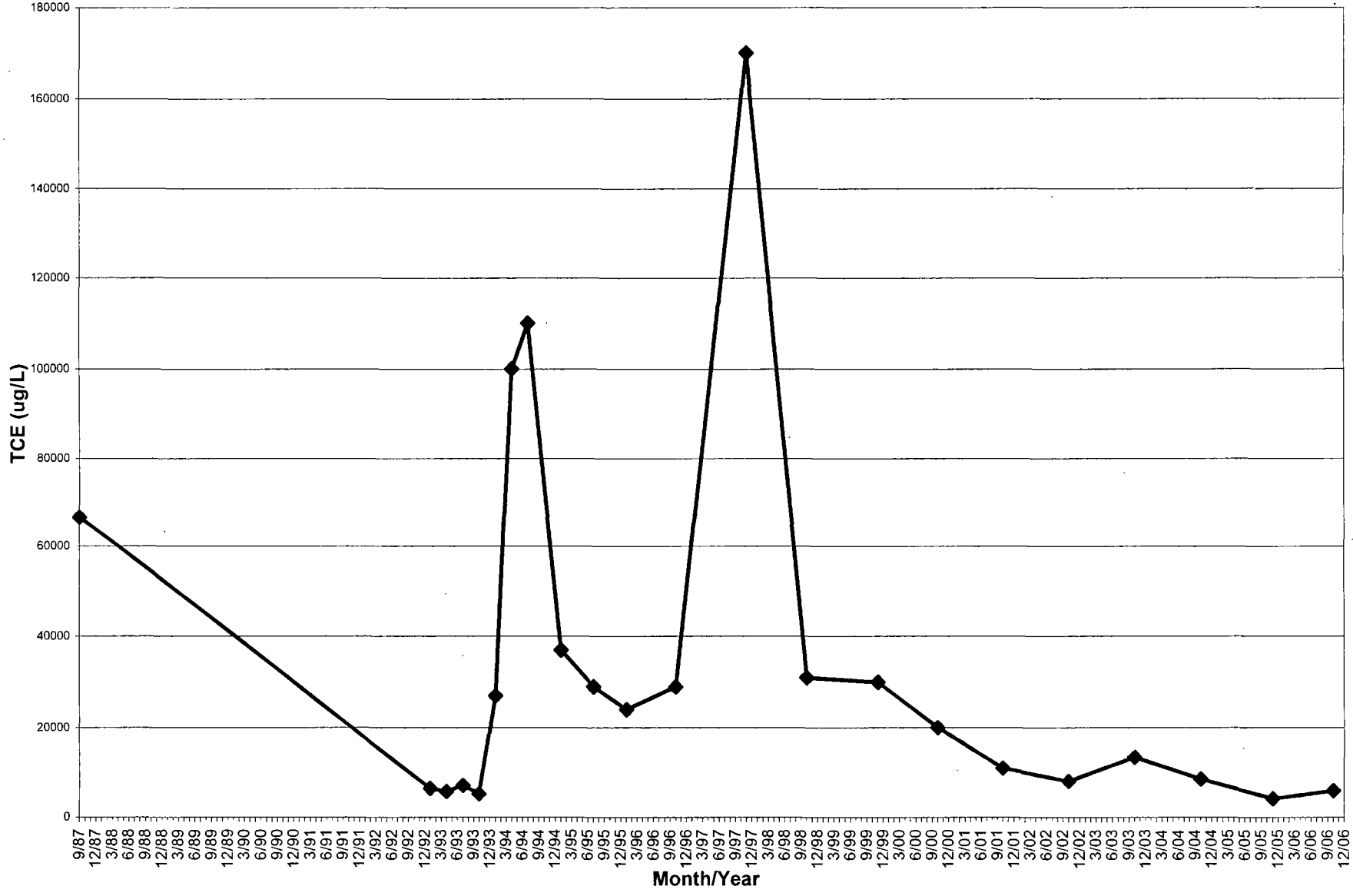


FIGURE 12
TCE Concentration Trend In UFSB Well SSC-24
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

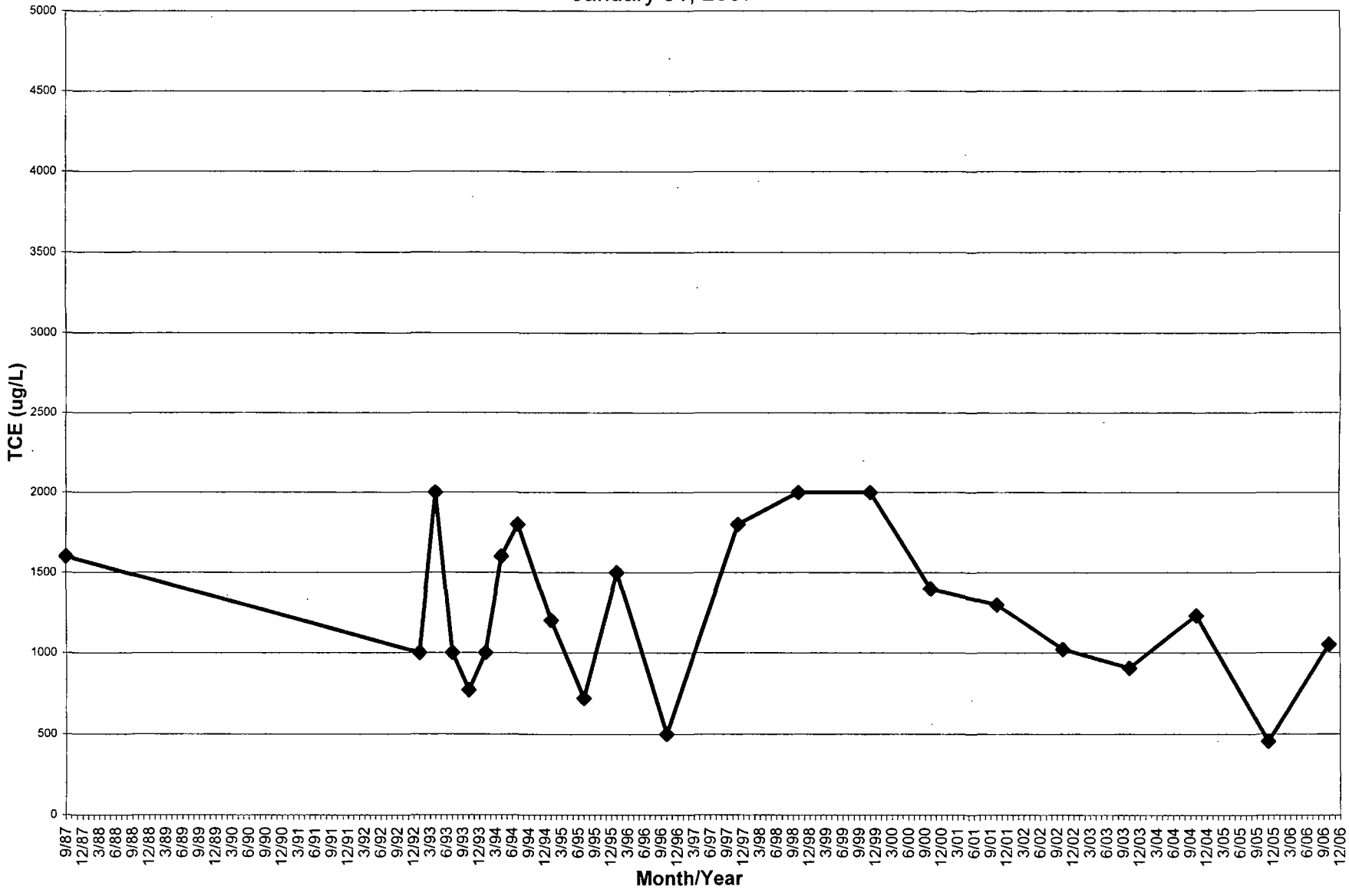


FIGURE 13
TCE Concentration Trend In UFSB Well SSC-26
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

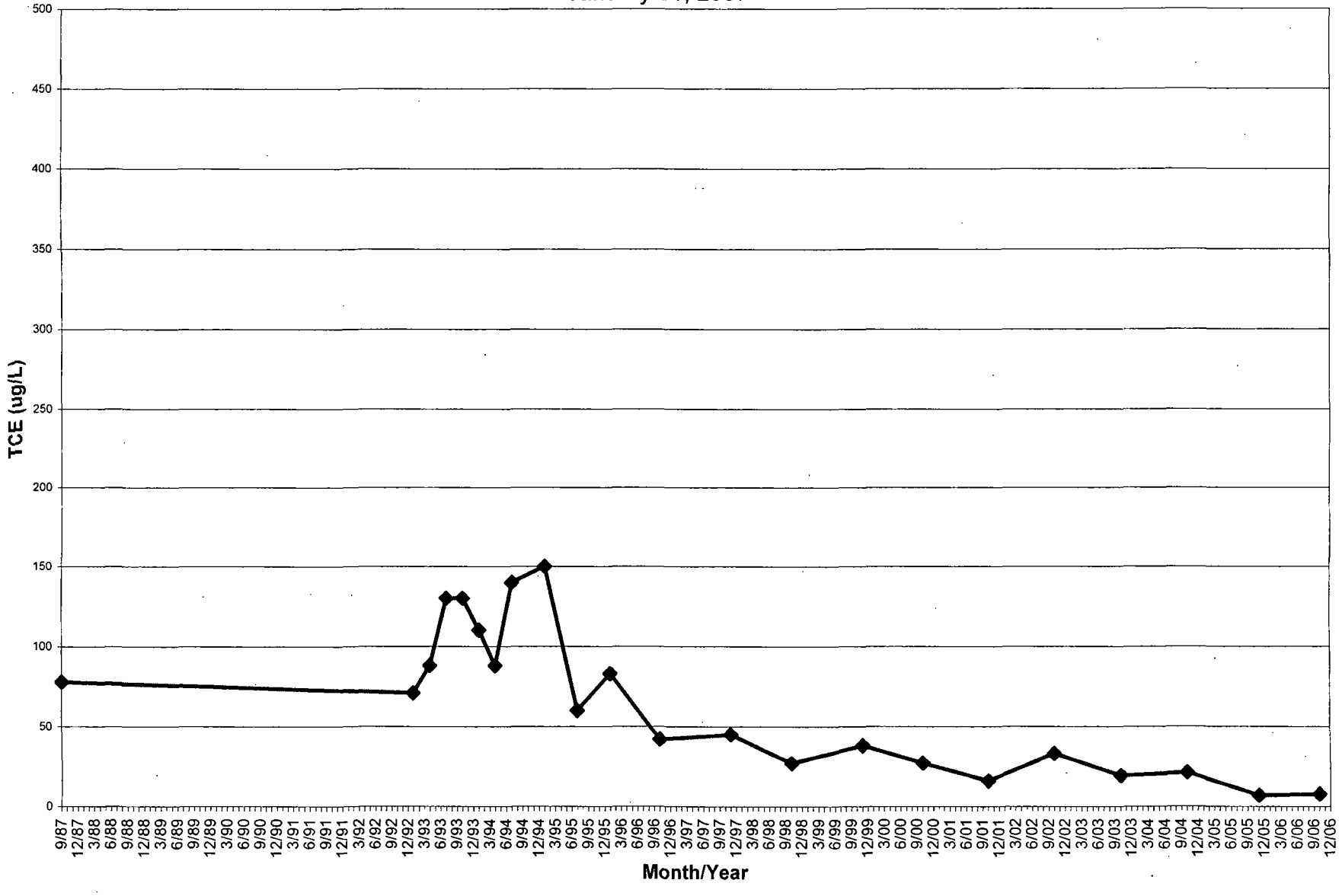


FIGURE 14
TCE Concentration Trend In UFSB Well SSC-27
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007

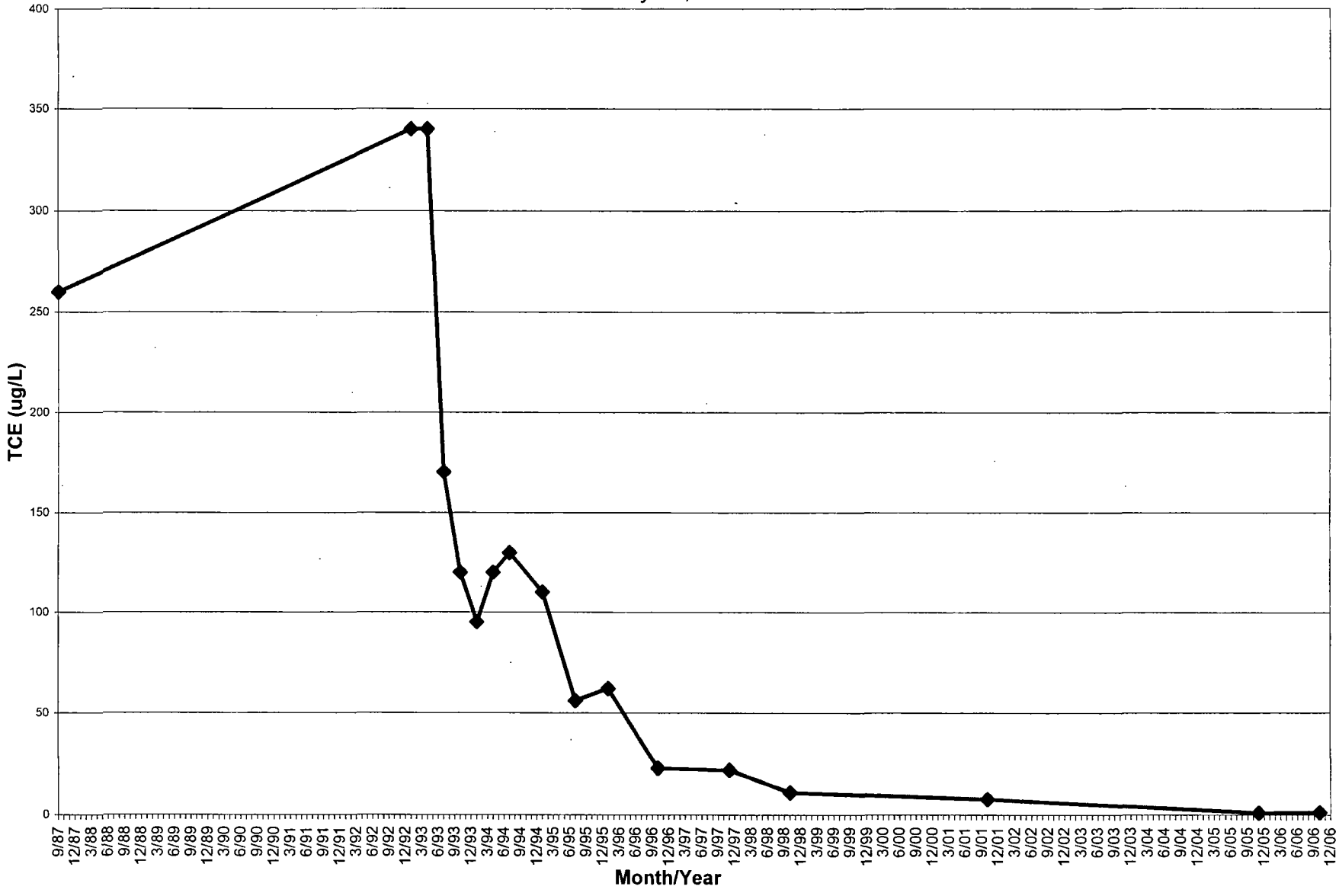
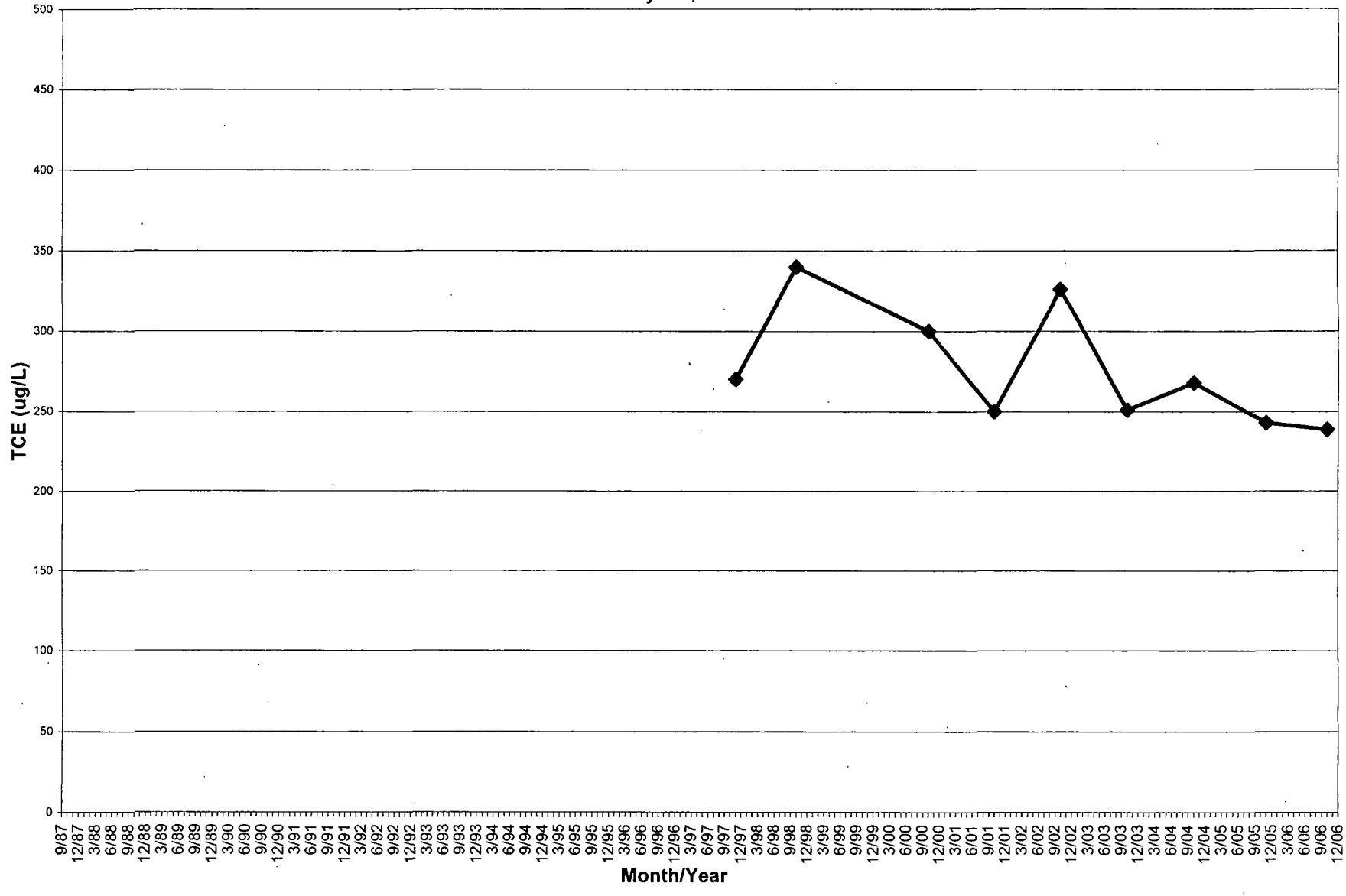


FIGURE 15
TCE Concentration Trend In UFSB Well SSC-32
Solid State Circuit, Inc. Superfund Site
MRAC Republic, Missouri Site
January 31, 2007



Attachment D

SITE INSPECTION PHOTOS

Well REM – 1

Wells REM–2 (foreground); SSC-11 (background left); SSC-29 (background right)

Wells SSC-6B (foreground); SSC-6C (left); REM-1 (background)

Well SSC – 9 with Daycare in Background

Well SSC-29

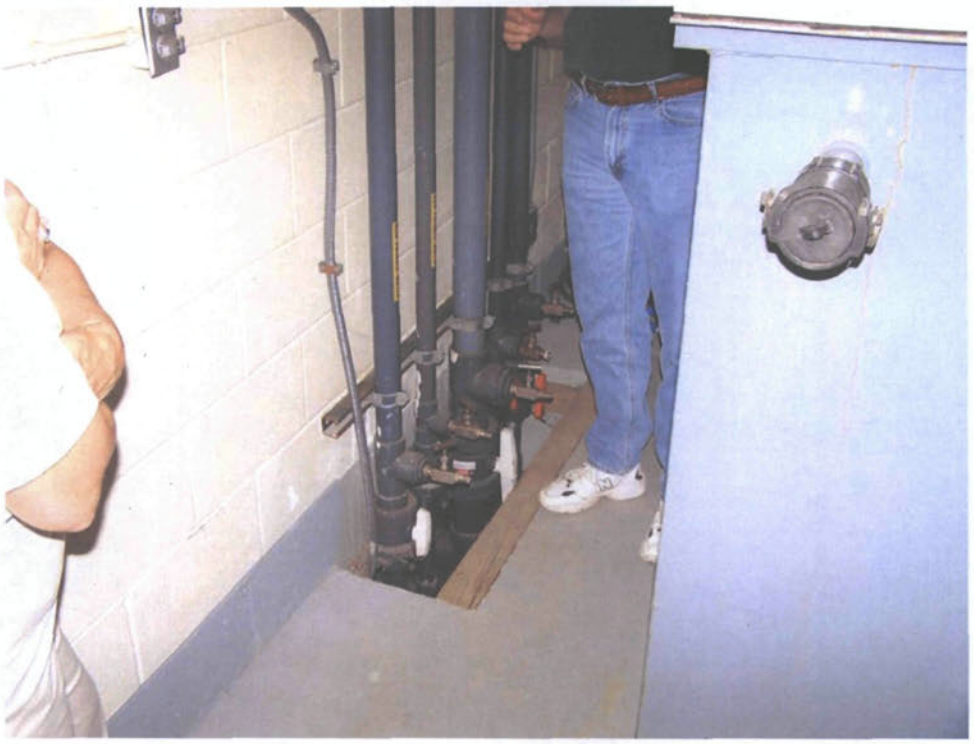
Horizontal Well Inlet

Wells SSC-3B (left); SSC-3A (right); CW-1 (background)

Left to Right Wells SSC-21, SSC-20, SSC-12

Well SSC-24: note faded label

Well SSC-30: note no identification label on well cover

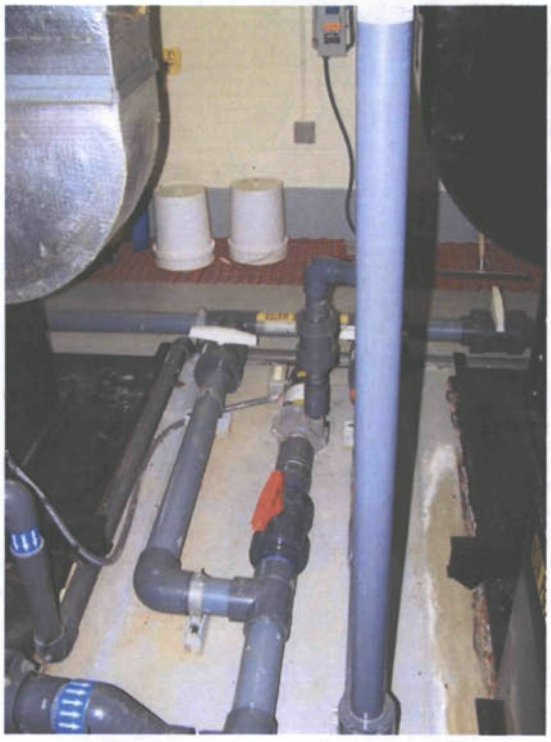


Influent Pipes with Valves and Sampling Ports, Influent Tank to right

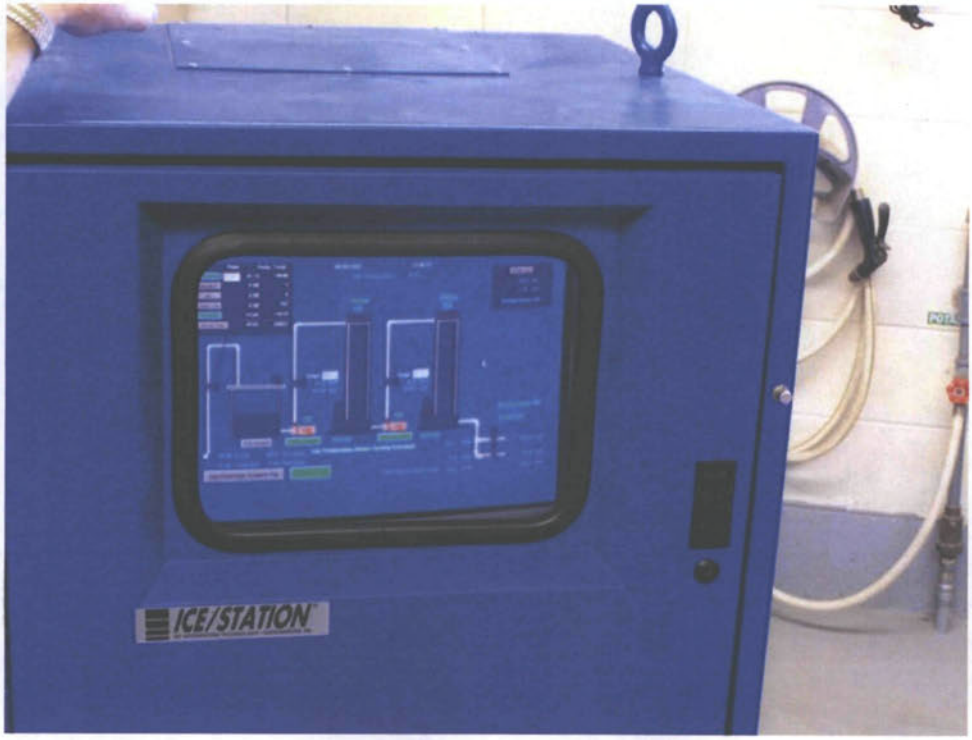
Influent Equalization Tank

Air Stripping Tower #1

Air Stripping Tower #2



Piping and Valves between Air Stripping Towers



Process Control Panel

Stripping Tower Effluent Line Extending through red floor grate

Effluent Discharge Pit

Site Fencing - note tree overhanging fence

Attachment E

SITE INSPECTION CHECKLIST AND ROSTER

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Solid State Circuits	**Date of inspection:** 6/4/07
Location and Region: Republic, MO	**EPA ID:** MOD980854111
Agency, office, or company leading the five-year review: EPA Region 7	**Weather/temperature:** Sunny, mid 80s

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other:
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Greg Vierkant (Name) MRAC/Alacatel-Lucent (Title) 6/4/07 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** David Vaughan (Name) EWI (Title) 6/4/07 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks

2. **Site-Specific Health and Safety Plan** — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Contingency plan/emergency response plan — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks

3. **O&M and OSHA Training Records** — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☒ Effluent discharge — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☒ Waste disposal, POTW — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

7. **Groundwater Monitoring Records** — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☒ Water (effluent) — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ☒ N/A

    Remarks Site locked

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☒ PRP in-house ☒ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate Table in text of report ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks No significant damage to fence

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks Sign on entrance gate. Phone number updated.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____

Frequency _____

Responsible party/agency _____

Contact _____ _____ _____ _____

Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks _____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks _____

3. **Land use changes off site** ☐ N/A

Remarks Daycare North of site

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☐ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

C. Letdown Channels ☐ Applicable ☐ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   - ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   - ☒ Air stripping ☐ Carbon adsorbers
   - ☐ Filters _____
   - ☐ Additive (*e.g.*, chelation agent, flocculent) _____
   - ☐ Others _____
   - ☒ Good condition ☐ Needs Maintenance
   - ☒ Sampling ports properly marked and functional
   - ☒ Sampling/maintenance log displayed and up to date
   - ☒ Equipment properly identified
   - ☐ Quantity of groundwater treated annually _____
   - ☐ Quantity of surface water treated annually _____
   - Remarks _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - ☐ N/A ☒ Good condition ☐ Needs Maintenance
   - Remarks _____

3. **Tanks, Vaults, Storage Vessels**
   - ☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   - Remarks _____

4. **Discharge Structure and Appurtenances**
   - ☐ N/A ☒ Good condition ☐ Needs Maintenance
   - Remarks _____

5. **Treatment Building(s)**
   - ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
   - ☐ Chemicals and equipment properly stored
   - Remarks _____

6. **Monitoring Wells** (pump and treatment remedy)
   - ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
   - ☒ All required wells located ☐ Needs Maintenance ☐ N/A
   - Remarks _____

D. Monitoring Data

1. Monitoring Data
   - ☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
   - ☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration, and gas emission, etc.).

See report

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

See report

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs which suggest the protectiveness of the remedy may be compromised in the future. See report
D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Site Inspection Team Roster		
Personnel	**Representing**	**Phone Number**
Steve Auchterlonie	EPA Region 7	913-551-7778
Diane Easley	EPA Region 7	913-551-7797
Candice McGhee	DNR/HWP	573-751-1738
Greg Vierkant	MRAC/Alcatel-Lucent	417-882-2211
David Vaughan	EWI	417-890-9500
Dave Nelson	USACE	816-389-3572
Vicki Murt	USACE	816-389-3889
Paul Speckin	USACE	816-389-3592
Brad Besett	City of Republic-water	417-732-3400
Ronnie Smith	City of Republic-water	417-732-3400

Attachment F

REFERENCE LIST AND RELEVANT DOCUMENTS REVIEWED

REFERENCES

City of Republic, Missouri, City Code 710.150 – Water Regulations, Last Amended August 2005

Missouri Code of State Regulations, 10 CSR 60-4. Department of Natural Resources, Division 20 – Safe Drinking Water Commission, Last Publish Date 10/31/03

Missouri Code of State Regulations, 10 CSR 20-7. Department of Natural Resources, Division 20 – Clean Water Commission, Last Publish Date 11/30/05

U.S. Environmental Protection Agency (EPA) 2006. National Recommended Water Quality Criteria, Office of Water, Office of Science and Technology (4303T)

U.S. Environmental Protection Agency (EPA) 2006. National Primary Drinking Water Standards. Office of Water (4606M)

U.S. Environmental Protection Agency (EPA) 2004. Draft Guidance for Evaluating the Vapor Intrusion Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)

U.S. Environmental Protection Agency (EPA) 1997. Ecological Risk Assessment Guidance for Superfund: Conducting Ecological Risk Assessments. EPA/540/R-97/006

U.S. Environmental Protection Agency (EPA) 1989. Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation.Manual (Part A). EPA/540/1-89/002

U.S. Environmental Protection Agency – Region 9 (EPA-R9), 2004. Preliminary Remediation Goals Table, October

United States Environmental Protection Agency (EPA) 2001, Comprehensive Five-Year Review Guidance. OSWER Directive 9355.7-03B-P

RELEVENT DOCUMENTS REVIEWED

The following documents were reviewed in completing the Five-Year Review:

- Record of Decision (ROD) including all attachments
- Consent Decree/Statement of Work (CD/SOW)
- Remedial Investigation (RI) Report
- Baseline Risk Assessment (BLRA)
- Remedial Action Construction Documents
- Remedial Action Operation and Maintenance (O&M) Plan
- Combined 2002 Annual Report and 4th Quarter Hydraulic Report
- Combined 2003 Annual Report and 4th Quarter Hydraulic Report
- Combined 2004 Annual Report and 4th Quarter Hydraulic Report
- Combined 2005 Annual Report and 4th Quarter Hydraulic Report
- Combined 2006 Annual Report and 4th Quarter Hydraulic Report
- Third Five-Year Performance Report For The Republic, Missouri, Site
- Combined 2007 Annual Report and 4th Quarter Hydraulic Report
- Second Five-Year Review Report

Attachment G

PUBLIC NOTICE
and
FACT SHEET

Missouri Department of Natural Resources
to conduct
Third Five-Year Review for the
Solid State Circuits Superfund Site
Republic, Missouri

The Missouri Department of Natural Resources will conduct the third Five-Year Review at the Solid States Circuit Superfund site. The review is required by the Superfund law to make sure the cleanup continues to protect human health and the environment.

The Administrative Record is available during normal business hours:

Springfield/Green County Library
Republic Branch Library
1264 U.S. Highway 60 E
Republic, Mo.

Questions or requests for information can be submitted to:

Candice McGhee
Project Manager
(573) 751-1738
or
Karen Cass
Community Relations Coordinator
(573) 751-7879

The Missouri Department of Natural Resources

Information Sheet

March 2007

Third Five-Year Review to Begin
Solid State Circuits Superfund Site
Republic, Missouri

Introduction

The Missouri Department of Natural Resources on behalf of the U.S. Environmental Protection Agency (EPA) conducts regular five-year reviews on Superfund sites where cleanups have been completed. These reviews are required by the Superfund law [42 U.S.C. Section 9621 (c)]. The department has initiated its third five-year review of the Solid State Circuits Superfund Site in Republic, Mo.

Site Background

The Solid State Circuits Superfund site covers one-half acre in downtown Republic. Trichloroethylene (TCE) was detected in *Municipal Well No. 1* in the 1980s. The well provided a large portion of the drinking water for the town. An investigation by the department determined Solid State Circuits, a former printed circuit board manufacturer, was the source of the TCE contamination. Contamination was also found in on-site and off-site ground water, on-site soil, and the remaining basement structure of a former building on the site.

Site removal actions completed between 1983 and 1985 included:

- removal of 2,000 cubic yards of contaminated material
- plugging and sealing of the basement's well
- removal of Republic's Municipal Well No.1 from service
- the basement was filled in with rock topped with 2 foot of soil that was graded and seeded
- a fence with a locking gate was added for security

Site remedial actions completed between 1989 and 1994 consisted of:

- installation of Municipal Wells Nos. 4 and 5
- installation of additional on-site and off-site monitoring wells to monitor the cleanup of the contaminated ground water
- installation of ground water extraction wells
- creation of an on-site treatment facility to treat the extracted contaminated ground water

Five-Year Review

The department will study site information during this third five-year review and inspect the site to determine if the remedy continues to protect human health and the environment. The department encourages members of the community to ask questions and report any concerns about the site. A final report will be prepared at the end of the review and will be available at the site information repository

Additional Information

The site administrative record is available during normal library hours:

Springfield/Green County Library
Republic Branch Library
1264 U.S. Highway 60 E
Republic, Mo.

Questions or requests for information can be submitted to:

Candice McGhee
Project Manager
(573) 751-1738

or

Karen Cass
Community Relations Coordinator
(573) 751-7879